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Social Collaboration Style Preferences and Cognitive Receptivity to Technological Change and Innovation in Open and Distance e-Learning

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Additional information is available at the end of the chapter

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Abstract

The proliferation of online courses in open and distance e-learning higher education contexts brought attention to the role of social collaboration activities in enhancing student learning. Constructive social collaboration in an e-learning environment is influenced by the interaction dynamics of the relevant virtual learning community. Social learning involves the acquisition of knowledge and skills relevant to the individual's unique work or learning context through collaborative endeavours and interactions that often include the use of technological tools such as web-based platforms and social media technological applications. This chapter focuses on how the social collaboration style preferences of members of the virtual learning community relate to their cognitive receptivity to technological change and innovation. The practical implications for virtual learning in open and distance e-learning contexts are outlined.

Keywords: social collaboration, social learning, virtual learning community, cognitive receptivity to technological change and innovation, self-other regulation

1. Introduction

Virtual learning environments and online learning platforms have become characteristic of open and distance e-learning institutions to support online teaching and learning [1]. More specifically, the proliferation of online courses in open and distance e-learning higher education contexts brought attention to the role of social collaboration online activities in enhancing student learning [2, 3]. The adoption of virtual learning systems such as online learning platforms, e-learning applications and collaborative virtual learning communities is

a new breed of educational technology that supports enhanced student learning experiences through a variety of online teaching and learning tools [1]. In this regard, higher education institutions that stay abreast with the latest information and communication technological developments are seen to be a driving force in preparing graduates to become valuable human capital that supports the performance and competitiveness of successful organisations in today's knowledge- and service-driven economy [1, 4]. In the light of constant technological innovation being a hallmark of successful companies, employers place high value on the digital citizenship and cognitive receptivity to technological change and innovation as important twenty-first-century skills for graduates' work readiness [4, 5].

Research has underlined the importance of studying dispositional and other person-related antecedents to individuals' cognitive receptivity to change and the adoption of new technologies in organisational context [4, 6, 7]. This is partly because of social psychology literature indicating attitudes, motivations and beliefs as significant predictors of behaviour [4]. The theory of reasoned action [4, 8] also postulates the link between beliefs and attitudes and behavioural intentions in the use of technology (i.e. electronic or digital products or services [9]). Numerous researches have been conducted on the factors influencing individuals' acceptance and adoption of technology [9–11] and openness to organisational change [6]. However, significantly less attention has been paid to how individuals' social collaboration learning styles in a virtual learning community influence their cognitive receptivity to technological change and innovation. The present study attempts to fill this research void by exploring the relationship dynamics between these two cognitive-behavioural constructs (social collaboration style and cognitive receptivity to technological change and innovation) in the virtual learning environment context provided by open and distance e-learning. This chapter explores whether individuals' social learning collaborative style preferences significantly explain the variance in their cognitive receptivity to technological change and innovation. Understanding the relationship dynamics between these two cognitive-behavioural constructs contributes to the emerging virtual learning research literature on factors influencing individuals' responsiveness to technological change.

1.1. Social collaboration style preferences

Social learning involves the acquisition of knowledge and skills relevant to the individual's unique work or learning context through collaborative endeavours and interactions that often include the use of technological tools such as web-based platforms and social media technological applications [3]. Social learning theory [12] postulates that learning takes place among and through other people and requires active participation in a social world. Social learning is an interpersonal and collaborative endeavour requiring significant social interaction [13]. The processes of participation and interaction are of significance because they provide, condition and sustain the context of knowledge generation and learning for the virtual community [14, 15]. Social learning through technological platform collaboration (for example, group debate forums) involves socially shared regulation and social regulation in coordinating and regulating work on a joint task [16]. Social constructivism postulates that in communities of collaborative learning individuals are autonomous in their self-expression, in the authoring

of their own content and in sharing that content with others in efficient and meaningful ways [17]. However, individuals differ in terms of their preferred way of interaction with others in a collaborative social learning set-up. Coetzee [18] differentiates between four social collaboration style preferences: (1) active-initiator, (2) independent-evaluator, (3) reflective-evaluator and (4) passive-independent.

- *Active-initiators* enjoy taking the lead in initiating discussions and debates because they see the collaboration as an opportunity to demonstrate their own insights and originality. They regulate the contributions of others by taking a critical evaluative stance and commenting on other members' ideas and viewpoints. Apart from enjoying bringing their own innovative and creative ideas to the group debate, active-evaluators also enjoy inviting debate from other members because their contributions are seen to stimulate new insights [18].
- *Independent-evaluators* tend to regulate others by preferring to ignore the ideas and viewpoints already posted; they would rather try to contribute their own unique ideas about the subject matter in order to bring a new perspective to the debate. They prefer to know the facts first about an idea before debating its importance and meaning. Independent-evaluators are often seen by other members as dominating the debate by their preferred critical and argumentative stance and questioning of other members' contributions and viewpoints [18].
- *Reflective-evaluators* tend to regulate others by responding to the ideas and viewpoints of other members. Their approach is constructive by building on and adding to the contributions of the group members. Reflective-evaluators enjoy encouraging other members by showing their appreciation for members' contributions, pointing out the importance and practical uses and limits of ideas and viewpoints, and searching for and finding new ideas and information that may help the group in completing the joint task successfully [18].
- Members with a *passive-independent* preference tend to avoid regulation of other members. They prefer to work on their own, independent from other group members in completing the task. The passive-independent prefers to act as an impartial observer of the group's ideas and debates and tends to focus on other members' responses and comments rather than contributing their own ideas. They are usually slow to catch up with the group debate and tend to be the last one to make any contributions. They find it difficult to participate in collaborative social activities and would rather prefer to keep their ideas and viewpoints to themselves [18].

Table 1 provides an overview of the dominant personality-based characteristics of the four social collaboration style preferences in a typical virtual learning setting.

Limited research has been conducted on the four social collaboration preferences postulated by Coetzee [18]. Social regulation theory [13] suggests that facilitative and directive forms of other-regulation influence the process of collaboration and quality of socioemotional interaction between group members within the community of collaborative learning. The active-initiator and independent-evaluator preferences represent characteristics of a directive other-regulation orientation (i.e. taking an instructive role in guiding the joint activity and others and controlling and/or dominating others' attempts at making task contribution [13]), while

the reflective-evaluator represents characteristics of a facilitative other-regulation orientation (i.e. high-level content processing via monitoring for content understanding and improved task and content quality [13]). Directive other-regulators tend to limit opportunities for other group members to regulate, contribute and participate in the joint task by preferring that their own contributions remain central to the discussion [13]. The facilitative other-regulators tend to regulate the collaboration and task quality by inviting and encouraging others to participate and contribute to the joint tasks and by facilitating cognition and content understanding through a meta-cognitive monitoring and guiding approach [13].

Social collaboration style preferences	Active-initiator	Independent-evaluator	Reflective-evaluator	Passive-independent
Other-regulation orientation	Initiating debate Bring own innovative and creative ideas to debate and invite debate to stimulate new insights	Critiquing debate to stimulate new perspectives—prefer to contribute own unique ideas about subject matter	Reflecting on and building on others' ideas/viewpoints —searching for and finding new ideas and information to support group—encouraging others/appreciative stance	Impartial observer—slow to catch up on debate, keep own viewpoints to self Resistant to contribute
Dominant regulation style	Directive style Proactive initiator/instructor (self-directed)	Directive style Proactive evaluator/instructor (self-directed)	Facilitative style High-level content processing—monitoring for content and process (other-directed)	Passive-reluctant style (other-directed)
Collaboration level	High	High	High	Low
Openness to change level	High	High	High	Low

Table 1. Overview of the dominant personality characteristics of the four social collaboration style preferences exhibited in a virtual learning setting.

Learning that requires collaboration in a virtual learning setting calls for proactive self-regulated learning from students [19]. As such, social collaborative regulation is influenced by the self-regulated learning capacity of the virtual learning community members. Self-regulated learning denotes the self-initiated management of thoughts, feelings and behaviours, which are used to achieve learning goals [20] and the extent to which participation in the virtual community will be initiated. Participation in the collaborative learning tasks refers to the amount of energy or effort that students devote to the learning activity [19]. Active learners tend to adopt a participatory learning style such as those represented by the active-initiator and independent-evaluator collaboration styles. Members with a participatory style prefer actively processing information by participating in learning activities and debates; they

consistently show initiative and accountability towards the successful completion of the learning task [19] and therefore tend to exhibit a high level of self-directedness and openness to change. On the other hand, collaboration styles such as the reflective-evaluator and passive-independent collaboration styles typically prefer working in individual learning spaces allowing them to reflect on the information obtained in solitude. Reflective learners such as those represented by the reflective-evaluator and passive-independent collaboration style types generally tend to exhibit lower levels of self-directedness and more resistance to change in a collaborative learning community because they tend to be more dependent on the participatory or directive and/or facilitative leadership energy of active learners.

1.2. Social collaborative learning and cognitive receptivity to technological change and innovation

In open and distance e-learning virtual learning communities, the affordances of technology offer important opportunities and challenges for enhancing students' learning processes and experiences, including the digital and personal capabilities that are foundational to their social competency and their personal and professional success [15]. Collaborative social learning in distance e-learning methodologies offers to distance learning students the opportunity to collaborate and interact with other members of the virtual learning community, which facilitates a sense of belongingness, reduces the feeling of loneliness and encourages learning [2]. Collaborative learning endeavours in virtual learning educational contexts offer cognitive advantages to students and positively influence the development of personality traits and personal skills that are beneficial for future autonomous or cooperative learning and working [2]. Research has indicated that social collaborative learning increases student achievement levels, helps e-learning students to be more conducive to long-term successful learning and develops high-level cognitive and problem-solving skills regarded as important by employers for their work readiness [2].

Virtual learning environments require a cognitive openness to new technological tools and platforms used in open and distance e-learning contexts for student learning. Such technologies include the use of web-based collaborative learning communities such as group discussion forums [19]. The extent to which an individual enjoys or is willing to trying out new applications, social media tools and applications and technological products reflects their cognitive openness to technological change and innovation [21]. Adopting new technologies and engaging in learning how to use and apply a new technological product are seen as an aspect of the individual's lifelong learning and development [21].

Theories of self-regulated learning provide a useful lens to understand the influence of self-initiated management of thoughts, feelings and behaviours in achieving specific learning goals in virtual learning communities [20, 22]. Both cognitive receptivity to technological change and innovation and social learning collaborative styles relate to the use of self-regulatory strategies and responsiveness. Constructive social collaboration in an e-learning environment is influenced by the interaction dynamics of the relevant virtual learning community [16]. Group collaboration involves self-regulatory cognitive processes in the regulation of others through the coordination and negotiation of varying group members' perspectives [13]. Research

shows that individual members differ significantly in the cognitive processes they apply in other regulation when working on collaborative group tasks [13, 23]. Similarly, openness to technological change and innovation involves self-regulatory cognitive processes in evaluating new technological products and services, taking risks in bringing new technological products and ideas to the table, seeing the benefits of adopting new technological innovations and devising strategies in trying out new applications, social media tools and technological products [21].

Cognitive receptivity to technological change and innovation is a form of change-oriented employee behaviour that represents agentic traits, such as proactivity and openness to experience, which indicate employees' tendencies to generate change in their social environment [24] and being resourceful in dealing with new and unusual technological experiences [21]. Individuals who are open to the innovation of new technologies generally believe that the new product will help them to change outdated work processes or improve outdated methods for performing work tasks [21]. On the other hand, individuals who are not ready for or who are overly cautious of new technological products and innovations may become resistant towards adopting the change represented by the new technological product [6, 21]. It stands then to reason that individuals with differing social learning collaboration style preferences may exhibit different levels of cognitive receptivity to technological change and innovation due to the inclination to function either more autonomous or independent from others or to actively initiate and regulate interaction with other members of the virtual learning community. The study presented in the following section explored the empirical association between individuals' social collaboration learning style and their cognitive receptivity to technological change and innovation as exhibited in a virtual learning environment context.

2. Method

2.1. Participants and procedure

Ethical clearance and permission to conduct the research were obtained from the management of the university. A random sample of working adults ($N = 160$; 67% black and 33% white people; 59% females and 41% males) enrolled for further studies at an open and distance higher education institution participated in the study. The participants were employed in the human resources and financial fields. The participants had an age range from 25 to 50 years with 80% in the early career stage (exploration and establishment phase) of their lives (25–40 years). Data were collected by means of a web-survey.

2.2. Measuring instruments

The participants' social collaboration style preferences were measured through the *social learning styles inventory* (SLSI) developed by Coetzee [18]. The SLSI uses a 5-point Likert-type scale (1 = never; 5 = almost always) with 45 items that measure individuals' orientation towards the use of social media tools and applications in collaborative learning activities: active-initiator (17 items; e.g. 'I prefer to initiate new ideas and stimulate the debate'); reflective-

evaluator (14 items; e.g. *'I respond to ideas and viewpoints by pointing out flaws in members' arguments in order to improve the reasoning/ideas'*); passive-independent (7 items; e.g. *'I prefer to act as impartial observer of the ideas and debates'*) and independent-evaluator (7 items; e.g. *'I prefer to ignore the ideas and viewpoints already posted and try to contribute my own unique ideas about the subject matter in order to bring a new perspective to the ideas'*). For the present study, the overall subscale Cronbach's α coefficients ranged between 0.79 and 0.97 (high internal consistency reliability). Previous research indicated construct validity of the scale [18].

The participants' levels of cognitive receptivity to technological change and innovation were measured through the *technological change receptivity scale* (TCRS) developed by Coetzee [18, 21]. The scale consists of 28 items and three subscales with a 6-point Likert-type response scale ranging from 0 (never) to 5 (almost always): (1) ingenuity (9 items; e.g. *I see myself as resourceful in dealing with new and unusual technological experiences/I like to take risks in bringing new ideas or products to the table*); (2) openness to change (11 items; e.g. *I believe that the innovation of new technological products helps create the future/I am quick to try out new apps and technological products*) and (3) resistant to change (8 items; e.g. *I find it difficult to adopt new technology—I would rather stick to the tried and tested/ I find it scary to try out new technological products*). Evidence of the construct and internal consistency reliability of the TCRS has been provided by Coetzee [21]. In terms of the present study, Cronbach's α coefficients for the three subscales were ingenuity (0.92), openness to change (0.93), resistant to change (0.79) and overall scale (0.90) (high internal consistency reliability). Previous research indicated construct validity of the scale [18, 21].

Demographic data were used as control variables and included: age (coded 0 = ≤ 45 years; 1 = ≥ 46 years), gender (coded 0 = male; 1 = female) and race (coded 0 = black; 1 = white). These variables were chosen based on previous research indicating that these variables are important to consider in evaluating individuals' career concerns and openness to change [6].

2.3. Statistical analysis

Bivariate correlation (Pearson's coefficients) analyses were calculated to assess the pattern of relationships between the variables of concern to the study. Point-biserial correlations were calculated for discrete dichotomous variables (i.e. the demographic variables). Canonical correlation analysis (CCA) was used to study the multivariate relationships between the four SLSI scores and the three TCRS scores. CCA is a useful multivariate statistical procedure in human behaviour research because it assesses the association between multiple sets of variables and counteracts type I error.

3. Results

As can be seen from **Table 2**, the practical effect of the significant correlations between the SLSI and TCRS variables ranged between $r \geq 0.23 \leq 0.52$ (small to large effect; $p \leq 0.01$). No significant correlations were observed between resistant to change and the active-initiator, reflective-

initiator and independent-evaluator variables. The passive-independent variable had no significant association with ingenuity and openness to change. Age had no significant associations with the SLSI and TCRS variables, while gender had associations of small practical effect ($r < 0.16$; $p < 0.05$) with only active-initiator and reflective-evaluator social learning styles and ingenuity. Race had associations of small practical effect ($r < 0.16$; $p < 0.05$) with only the active-initiator, reflective-evaluator and passive-independent social learning styles.

	M	SD	α	1	2	3	4	5	6	7	8	9	10	11
1 Age	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2 Gender	-	-	-	-.06	-	-	-	-	-	-	-	-	-	-
3 Race	-	-	-	-.22**	.19**	-	-	-	-	-	-	-	-	-
4 Active-initiator	3.87	1.30	.97	.03	-.20**	-.21**	-	-	-	-	-	-	-	-
5 Reflective-evaluator	5.00	2.29	.95	.10	-.23**	-.17*	.82***	-	-	-	-	-	-	-
6 Passive-independent	3.75	1.09	.79	-.004	-.11	.16*	.44***	.45***	-	-	-	-	-	-
7 Independent-evaluator	4.08	1.17	.83	.02	-.20**	-.06	.85***	.76***	.55***	-	-	-	-	-
8 Ingenuity	4.55	1.07	.92	-.08	-.16*	-.08	.52***	.48***	.13	.50***	-	-	-	-
9 Openness to change	5.07	1.04	.93	-.10	-.07	-.10	.47***	.41***	.12	.38***	.80***	-	-	-
10 Resistance to change	3.26	.77	.79	.01	-.05	.08	-.12	-.02	.24**	.03	-.17*	-.30*	-	-
11 Overall technological change receptivity	4.29	.65	.90	-.10	-.15	-.07	.49***	.47***	.23**	.49***	.91***	.85***	.14*	-

*** $p \leq .001$; ** $p \leq .01$; * $p \leq .05$ (two-tailed).

Table 2. Descriptive statistics and zero-order correlations.

Canonical correlation analysis was used to study the multivariate relationships between the four SLSI scale scores and the three TCRS scale scores. **Table 3** shows that the full model was significant using Wilks' multivariate test criterion (Wilks' $\lambda = 0.5757$, function 1: $F_p = 7.83$, $p = 0.0001$). The first function of the model was significant and contributed to 56% of the overall explained variation relative to the function. The full model r^2 type effect size (yielded by $1 - \lambda$) was 0.42 (large practical effect), indicating that the full model explains an adequate proportion of the variance shared between the two variable sets. The redundancy index results summarised in **Table 2** show that the social learning styles represented by the SLSI variables was able to predict 20% (moderate practical effect) of the proportion of overall variance in the technological change receptivity variables.

3 provides the canonical coefficients (weights), canonical structure coefficients (R_c), canonical cross-loadings (R_c) and squared canonical loadings (R_c^2). Overall, only three of the social learning styles (active-initiator, reflective-evaluator and independent-evaluator) significantly predicted the technological change receptivity construct variables with the exception of the resistant to change variable, which also did not contribute much to explaining the technological change receptivity canonical construct variate. The canonical cross-loading R_c coefficients indicated that the three social learning styles explained 31% ($R_c = 0.56/R_c^2 = 0.31$, large practical

effect) of the variance in ingenuity and 22% ($R_c = 0.47/R_c^2 = 0.22$, moderate practical effect) of the variance in openness to change.

Variate/variables	Canonical coefficients	Structure coefficient (R_c)	Canonical cross-loadings (R_c)	Squared canonical loadings (R_c^2)
<i>Social collaboration style preferences canonical variate variables</i>				
Active-initiator	-0.61	0.93	0.52	0.28
Reflective-evaluator	-1.44	0.84	0.47	0.22
Passive-independent	-0.79	0.19	0.11	0.01
Independent-evaluator	0.00	0.86	0.48	0.23
<i>Technological change receptivity canonical variate variables</i>				
Ingenuity	1.08	0.99	0.56	0.31
Openness to change	0.22	0.83	0.47	0.22
Resistance to change	0.00	-0.27	-0.15	0.02

Overall model fit measures (function 1):

Overall $R_c = 0.56$

Proportion = 0.32

$F(p) = 7.83$ ($p < 0.0001$); $df = 12; 405.09$

***Wilks' $\lambda = 0.5757$

r^2 type effect size: $1-\lambda = 0.42$ (large practical effect)

Redundancy index (standardised variance of technological change receptivity explained by the social collaboration style preferences): Proportion = 0.20.

*** $p \leq .0001$;

Table 3. Results of the standardised canonical correlation analysis for the first canonical function.

Overall, the active-initiator style ($R_c = 0.93$), followed by the independent-evaluator ($R_c = 0.86$) and reflective-evaluator style ($R_c = 0.84$), contributed the most in explaining the variance in the social learning styles canonical variate construct and in predicting the technological change receptivity variables.

4. Discussion

This chapter explored the association between adult learners' social collaboration style preferences and their cognitive receptivity to technological change and innovation. The empirical results clarified the magnitude and direction of the relationships between these two cognitive-behavioural constructs. As shown in **Figure 1**, the active-initiator style, followed by the independent-evaluator and reflective-evaluator style, contributed the most in predicting adult learners' technological ingenuity and openness to technological change. The participants who had a preference for these three social collaboration styles also exhibited less resistance to technological change and innovation and an openness towards and resourcefulness in dealing with new and unusual technological products and applications. The passive-independent style and attitudes of resistance to technological change contributed less to this association.

The positive association between especially the active-initiator style preference and cognitive receptivity to technological change and innovation suggests that those student participants who enjoy taking the lead in initiating discussions and debates in the virtual community are likely to be keen to demonstrate their ingenuity in using new technological products. This finding corroborates Coetzee's [18] premise that active-initiators generally see social collaboration as an opportunity to demonstrate their own insights and originality. Active-evaluators are high self-other regulators who generally enjoy inviting debate from other members because their own and others' contributions are seen to stimulate new insights [18]. Their strong initiating style appears to be associated with positive perceptions of technology and an eagerness to engage with new technological products and applications.

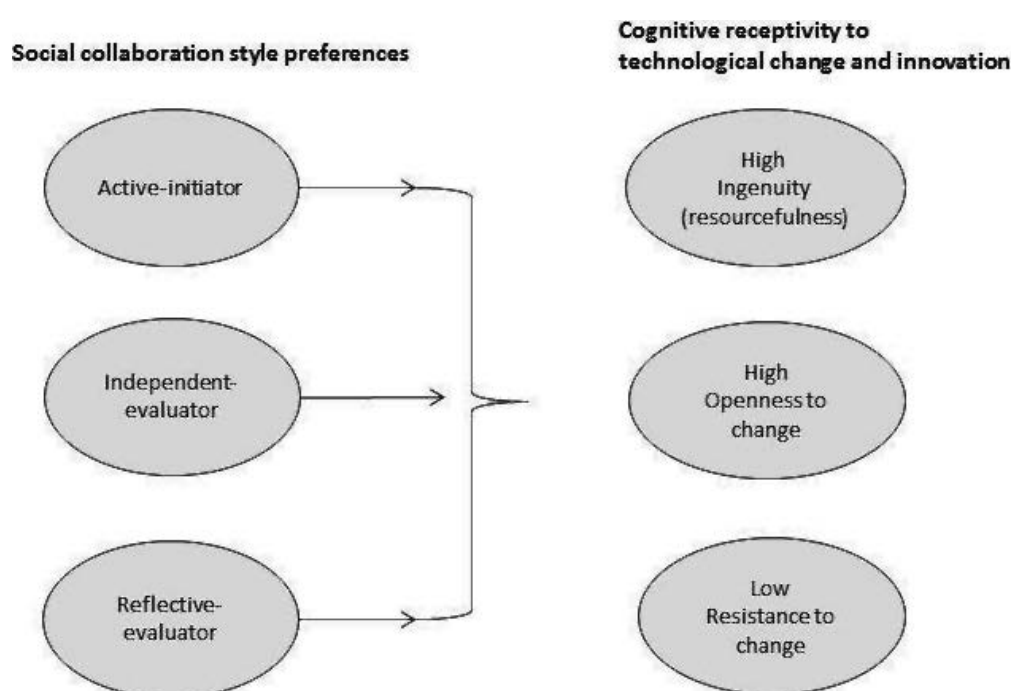


Figure 1. Key finding: association between the social collaboration style preferences and cognitive receptivity to technological change and innovation.

The independent-evaluators also showed a high level of cognitive receptivity to change and ingenuity (resourcefulness in dealing with new technological products and applications), which could be attributed to their preference to bring a new perspective to the debate by contributing their own unique ideas about the subject matter [18, 21]. The results further suggest that the reflective-evaluators' cognitive receptivity to technological change and innovation may be attributed to their preference for constructively building on and adding to the group's contributions. They generally prefer to search for and find new ideas and information that may help the group in completing the joint task successfully [18].

The active-initiator, independent-evaluator and reflective-evaluator style preferences reflect change-oriented behaviour that represents agentic traits such as proactivity and openness to experience. These personality attributes have been associated with peoples' tendencies to

generate change in their social environment [24] and being resourceful in dealing with new and unusual technological experiences [21]. Moreover, individuals who exhibit a preference for these three social collaboration styles generally tend to have a more positive perception of their ability to regulate their own and others' behaviour in a virtual learning community setting [13, 18]. It appears from the findings of the study that this sense of control is also likely to be positively extended to their perceptions of digital technological products and innovations. This finding corroborates research that indicated that locus of control influences the way people perceive and interact with information technology [25]. Research has also indicated self-directedness (self-directed learning, self-regulated strategies and self-motivated behaviour) as a powerful precursor of academic performance and goal-oriented learning [25]. Cognitive receptivity to technological change and innovation suggests goal-oriented behaviour in the utilisation of technological products and applications for one's personal growth and development. This view is in agreement with research that indicated positive associations between people's cognitive receptivity to change and innovation and their lifelong learning orientation [21].

4.1. Limitations and suggestions for future research

The findings need to be considered in the light of the limitations of the research design. The maximisation technique utilised in canonical correlation analysis points to the possibility of overestimation that may occur in canonical models due to the amplification of linear composites [26]. Generalisability of the findings to populations in different occupational industries and educational settings is limited by the relative small sample being confined to a specific population in the South African higher education context. Testing the variables on various multicultural populations from various occupational groups may further inform theories on personality variables that influence adult learners' anthropomorphic perception or cognitive openness towards digital technologies in virtual learning contexts. Future studies could consider longitudinal research designs exploring the link between individuals' social collaboration style preferences and their cognitive receptivity to technological change and innovation as their motivational beliefs, digital skills and citizenship, and adaptability develop over time. The measuring instruments used for studying the association between individuals' social collaboration style preferences and their cognitive receptivity to technological change and innovation drew on individuals' subjective perceptions and not actual behaviours. Ascertaining whether these perceptions may promote actual receptivity towards new innovations in technological products and applications needs further investigation by means of longitudinal research designs and additional measures.

4.2. Implications for theory and practice

Notwithstanding the limitations of the research design, the literature and study findings outlined in the chapter contributed valuable insights about the association between adult learners' anthropomorphic perception (cognitive receptivity) of technological products and innovations and their social collaboration style preferences. The value-add of the theoretical and empirical contribution is considered in the light of the little research that has been to date

conducted on these constructs in the open and distance e-learning context in South Africa. Theory and research indicated that individual members in the virtual learning community generally differ in the cognitive processes they apply in self-regulation and other regulation when working on collaborative group tasks [13, 23]. These differences influence their cognitive receptivity towards the social learning digital technology that is available for virtual learning contexts. Understanding the relationship dynamics between the two cognitive-behavioural constructs that were discussed in this chapter (social collaboration style preferences and cognitive receptivity to technological change and innovation) contributed to the research literature on factors influencing virtual learners' responsiveness to new technological products and applications.

The new insights and knowledge generated by the research are important in the light of digital literate citizenship regarded as a social demand in today's knowledge and information technology society [25]. Cognitive receptivity to technological innovations and their applications in educational and employment settings has become essential for survival in the contemporary society of knowledge and innovation [21]. Open and distance e-learning educational settings that focus on the application of new information systems and digital technological products and innovations enhance students' learning and prepare them as adult learners for the demands of employers who have to sustain a competitive business in a knowledge and information society [21].

E-learning designers and developers can use the new knowledge and insights demonstrated by the literature and empirical study in the design of e-learning collaborative tasks and activities. Adult learners should learn to understand the importance of digital citizenship and willingness to collaborate and engage with others in a virtual learning community through digital tools of communication and learning. Educators should make adult learners who are resistant or reluctant to engage with others in a virtual learning setting aware of how their social collaboration style preferences potentially influence their willingness to engage with others through digital tools. Adult learners with a passive-independent style preference should understand how their reluctance influences their cognitive receptivity to technological change and innovation, which, in turn, may potentially negatively influence their work readiness and career success in a digital society.

Learners who prefer to act as leaders in a virtual learning community such as those with an active-initiator collaboration style can be encouraged to use their style preference in inviting more reluctant and independent learners (i.e. those with a passive-independent style) to engage with digital technology in contributing their ideas to the virtual learning community. Similarly, independent-evaluators and reflective-evaluators can play a supportive role in the virtual learning community by eliciting participative behaviour from the more reluctant and resistant member. The active-initiator, independent-evaluator and reflective-evaluator style preferences generally tend to have a more positive perception of their ability to regulate their own and others' behaviour in a virtual learning community setting, and it appears that this sense of control is also likely to be positively extended to their perceptions of digital technological products and innovations. Encouraging adult learners' cognitive receptivity to technological change and innovation has become essential in a digital information society.

Technological advancements in the knowledge-based economy and information society will continue to result in frequent changes in the workplace and the nature of jobs. Developing one's digital social citizenship has therefore become an important aspect of people's lifelong learning and employability.

Educators should also take note that collaborative learning tasks in a virtual learning setting can place high demands on limited cognitive resources, often due to the ill-structured nature of the tasks and lack of clarity regarding the learning goals to achieve through the collaboration. Collaborating with fellow students in a virtual learning setting through social tools, such as discussion forums, for example, requires self-initiated self-regulatory processes apart from the other-regulation processes represented by the social collaboration style preferences. However, research has shown that students often do not self-initiate a high degree of self-directed learning processes and often struggle when engaging in ill-structured learning tasks [22]. Educators and e-tutors can consider scaffolding self-directed learning by providing timely instructional prompts and feedback on the role and contributions made by the virtual community members to the debate. From a cognitive meta-perspective, educators or e-tutors can timely adopt either a directive and/or facilitative style in regulating the participation of students in support of the members' dominant social collaboration style preferences. They can also act as moderators of the quality of the content of the debate and provide feedback to the members of the debate. By identifying the dominant social collaboration style preferences of the various members who participate in the collaborative learning task, strategies to encourage and facilitate optimal and quality participation of all members can be achieved. This type of intervention by the educator or e-tutor can support the learning of members and facilitate the development of the self-directed learning and other regulation qualities required for effective learning in a virtual learning setting. Experiencing successful learning through the use and application of digital technologies may further enhance a receptivity to adapt to changing technological innovations in virtual learning settings.

5. Conclusion

The chapter contributed to the sparse literature and research on the role of personality characteristics in people's ability to accept and adapt to the requirements of a digital information technology-driven society. More specifically, the research findings enhanced understanding of the association between adult learners' social collaboration style preferences and their willingness to engage with new technologies in a digitised learning environment. Exploring this association within the context of a virtual learning environment setting provided valuable insights that contributed to the new emerging research literature on the demands and challenges of open and distance e-learning in a digital society. The new knowledge contributed by the chapter can be used to enhance the learning experiences of the open and distance e-learning student.

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