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Creativity Through Self-Directed Learning: Three Distinct Dimensions of Teacher Support

Abstract

Self-directed learning and creativity are critical workplace competences that are important to foster in formal educational settings. Previous studies have identified a relationship between self-directed learning and creativity, but the specific nature of this relationship is unclear. The purpose of the present theoretical paper is to examine through a literature review the possibility that creative learning outcomes can be supported through a self-directed learning process. The importance of considering self-directed learning in the context of adult learning – as a pragmatic learning process – is outlined. A conclusion is drawn that (1) creative learning outcomes are potentially supported through self-directed learning, and (2) in the process, teachers can provide support to learners in three distinct different ways. A variety of pragmatic educational activities that may enable self-directed learning and creative learning outcomes are discussed, including experiential learning; workplace simulations; and problem-, case-, and (e-) portfolio-based learning. In these activities, teacher support seems advantageous for many learners. The three distinct dimensions of teacher support identified in the present paper are important to consider in further empirical studies on self-directed learning.

Key words

Self-directed learning; creativity; constructivism; experiential learning; pragmatism

1. Introduction

Self-directed learning and creativity have been positioned as critical workplace competences that are necessary to foster in formal educational settings (Clain, 2016; European Commission, 2015; Lundvall & Rasmussen, 2016). In this regard, workplace competence concerns an employee's ability to act in order to successfully manage their occupational requirements (Arnold, Nolda, & Nuissl von Rein, 2010).

Self-directed learning and creativity are especially relevant in working fields in which employees are constantly faced with the need to solve problems, particularly in working environments where social contextual conditions are rapidly changing, such as in medicine, computer science, engineering, nursing, psychology, and business management (e.g., Finnegan, Valadas, O'Neill, Fragoso, & Paulos, 2019). In this regard, the present paper may be of interest to a variety of educational stakeholders including not only teachers, curriculum developers, managers, and government policy-makers, but also personnel concerned with human resource development.

The purpose of the present paper is to examine through a literature review the didactical possibility that creative learning outcomes may be supported by a self-directed learning process. I argue that adult self-directed learning commonly represents a process of solving or resolving real-world work- or life-centred problems (cf. Morris, 2019a). In this respect, conceptualising self-directed learning as a pragmatic process represents the central framework for the present paper.

In the following sections creativity and self-directed learning are defined. This is followed by an examination of the importance of conceptualising the process of self-directed learning in the context of adult learning – as a pragmatic learning process – in which adults are tasked to generate solutions to work- or life-centred problems. Additionally, educational activities that can enable creative learning outcomes through a pragmatic self-directed learning process are discussed. Finally, three distinct dimensions of teacher support are presented.

2. Creativity

The definition of creativity used in this paper derived from the field of psychology and stipulates two key elements: novelty and utility (Perry & Collier, 2018). Mishra, Henriksen, and Group (2013) highlighted the point that creativity involves generating solutions that are novel, effective, and whole. Moreover, in the context of education, Robinson and Aronica (2009) defined creativity as "the process of having original ideas that have value" (p. 67). In the present paper, in the context of adult learning, creativity is defined as a process of generating novel solutions to defined problems in specified contexts that have value.

Some scholars have argued that everyone has the potential to be creative (e.g., Ma, Yang, Wang, & Zang, 2018). But, at the same time, researchers have identified that educational environments may have a strong influence upon learners' creative potential (e.g., Giroux & Schmidt, 2004; Mishra, Fahnoe, & Henriksen, 2013), including the capacity to quash learners' creative potential when they are exposed to educational environments that do not inspire creative growth (cf. Robinson & Aronica, 2009).

Importantly, for an adult, creativity is sometimes a distinct advantage. For instance, when an employee seeks to generate a solution to a real-world problem sometimes a creative solution

could be viewed as the most successful and efficient learning outcome (Davis, 2012). For example, in the context of engineering Duffy and Bowe (2010) argued that "Creativity, initiative and the ability to independently learn are always needed as engineers are continually presented with problems that were not mentioned in their undergraduate studies" (p. 1). In this regard, an employee's ability to independently learn in order to successfully and efficiently create solutions to defined problems in specified contexts concerns self-directed learning competence.

Previous studies in various adult learning contexts have suggested a relationship between self-directed learning and creativity, but the specific nature of this relationship is unclear. For instance, Van Rensburg and Botma (2015) proposed that teachers of nursing could use learning approaches that stimulate creativity in order to foster learners' self-directed learning readiness. Also, Guglielmino (2008) concluded that adults with a high level of self-directed learning readiness usually tend to perform well in jobs that require high degrees of creativity. Moreover, in a systemic analysis of vocational education of young adult learners in England, Morris (2018) observed that creative learning outcomes were evident when teachers did not dominate the control of directing the learning process. However, due to the cross-sectional nature of Morris's study, insight into the direction of causation was not possible. Specifically, it is conceivable that a self-directed learning process enables creativity, but also that teachers facilitate self-directed learning because learners are creative. A bidirectional relationship also seems feasible. The present paper examines the feasibility of the former of these two bidirectional possibilities: that a self-directed learning process enables learners to generate creative learning outcomes.

3. Self-directed learning

Self-directed learning positions with humanistic philosophy and constructivist epistemology (cf. Morris, 2019c). Early scholarly work on self-directed learning defined the process as a "major, highly deliberate effort to gain certain knowledge and skill (or to change in some other way)" (Tough, 1971, p. 1), or,

> a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes. (Knowles, 1975, p. 18)

It is important to highlight the point that historically two key limitations of highly influential scholarly work on self-directed learning have potentially restricted the insight into the understanding of how creative learning outcomes might be supported through self-directed learning: (1) a lack of consideration of the effectiveness, nature, or efficiency of the learning outcomes generated from the self-directed learning process; and (2) a lack of consideration that in the context of adult learning self-directed learning is commonly a pragmatic process.

In particular, in an influential empirical study on self-directed learning, through highly structured interviews with 66 Canadian adults, Allen Tough (1971) concluded that self-directed learning is a normal and important part of adults' lives and often has a pragmatic purpose mostly related to an adult's work life. Thus, self-directed learning was conceptualised by Tough as a pragmatic life-centered process. Nonetheless, a foremost limitation of this study was that little insight was given into the effectiveness, nature, or efficiency of the learning outcomes achieved from the self-directed learning process.

Moreover, Malcolm Knowles, who was also an influential scholar on self-directed learning, provided accounts of facilitating self-directed learning with North American university students

(Knowles, 1975). Nonetheless, on closer investigation of Knowles's definition (the definition is found at the first paragraph of the present section of this article), which is the most widely accepted definition of self-directed learning (according to Guglielmino, Long, & Hiemstra, 2004), the pragmatic dimension of adult learning was not overtly highlighted. Actually, the definition could be interpreted as one of academic inquiry that might be operationalised as part of a decontextualised nonpragmatic learning process. Specifically, Knowles did not place an emphasis on self-directed learning being part of a life-centred process driven by the need to solve or resolve problems in real-world contexts. This is perhaps somewhat odd given that in Knowles's other work, on Andragogy in particular (Knowles, 1980), he proposed that a key principle of adult learning is that it is a pragmatic contextualised process driven by the need to solve life-centred problems. Nonetheless, importantly, many empirical studies on self-directed learning in a variety of educational contexts continue to be framed through Knowles's definition of self-directed learning – without considering the pragmatic dimension of the process (e.g., Lee, Yeung, & Ip, 2017; Nasri, 2017).

4. The pragmatic dimension of self-directed learning

The pragmatic dimension of adult learning is addressed in the historical work of Eduard Lindeman (1926). In reference to the work of Dewey, Lindeman (1926) proposed a "situation approach" (p. 193) to adult learning that encompasses adult learners asking four questions: "(1) What situation have we here? (2) What sort of problem does it show? (3) What new information does it involve? (4) What action will set us towards a solution?" (p. 193). Building upon the work of Lindeman (1926), a process model of a pragmatic learning process is depicted in Figure 1. The figure shows that a pragmatic learning process has four salient features: (1) a context (2)

a problem (3) a process of information seeking, and (4) a solution that is tested against the problem in context.

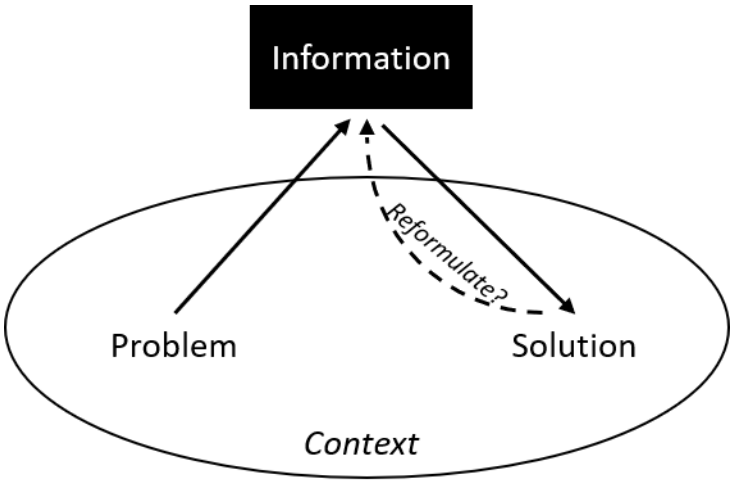

Figure 1. The Pragmatic Learning Process Model

Figure 1 shows that a pragmatic process supports an active learner process of information seeking, concurring *in part* with Knowles's (1975) definition of self-directed learning. But in addition, the model highlights that the process is driven by a defined problem in a specified context. Moreover, the solution generated is evaluated by testing it against the problem in context, enabling insight into whether there is a need for reformulation of the solution, which might require further seeking of information. Examples of educational activities that may support this model are discussed later in the present paper.

When learners engage in a process of solving problems in context learning becomes a contextualised process. In this regard, learners will in most circumstances benefit from attending to the contextual information specific to the problem in order to grasp a holistic understanding of what the problem is exactly and permit a process of generating a fitting

solution (Morris, 2019a, b). Contextually specific information includes information obtained through all the sensory organs (Kolb & Kolb, 2013). Moreover, in order to secure a *full* contextually specific appreciation of the problem, it might be important for learners to consider the broader dimensions of the contextual information, which may include the sociocultural and historical roots of the problem (Barnes, 2016; Cole, 1996*).*

A pragmatic learning process (as per Figure 1) centres around a process of inquiry (cf. Morris, 2019a). Notably, Dewey (1916/2013) proposed that inquiry is the basic method of learning – judgemental thought is essential for "knowing". In an inquiry process, learning outcomes cannot definitely be predicted in advance and creative solutions are possible (Tomczyk, Vanek, Pavlov, Karikova, Biresova, & Kryston, 2018). The process would seemingly benefit from learners being open to new ideas, including creative ideas. Indeed, cognitive openness, defined as an "openness to new ideas and activities, ability to change, and tolerance to ambiguity" (Oddi, 1986, p. 99), is deemed a key characteristic of learners who regularly undertake self-directed learning. *E*mpirical studies have reported strong correlations between learner self-directedness and the personality trait of openness (e.g., Kirwan, Lounsbury, & Gibson, 2010, 2014).

In this regard, it should be considered that self-directed learning is underpinned by constructivist epistemology. In accordance with the constructivist perspective, learning is viewed as an individual, interpretive, and active process of knowledge construction; where meaning-making is dependent upon past and present personal knowledge structures (Merriam, Caffarella, & Baumgartner, 2007).

Jonassen (1999) identified the point that the fundamental difference of constructivist learning environments is that they involve learners solving an issue, question, case, problem, or project,

which is situated in or based on a real-world context. Moreover, it should be considered that during the reflective observation phase of the learning process, if attention is given by the learners to the specific conditions of the problem in context, meaning schemes may assimilate critically (refer to Morris, 2019b for a review). This means that the meaning-making process happens with consideration of the contextual conditions specific to the problem. Morris (2019b) discussed that it is possible that this enables a deeper conceptual understanding and learners may begin to view knowledge in a different way: in other words, learners might start to appreciate that a solution generated may not be fitting for differential problems in similar contexts or for similar problems in differential contexts. In this regard, Scott (2018) discussed that learners may benefit from taking a stance that all knowledge is provisional; Scott's point draws on a Socratic concept that learners should take the stance that they do not *yet* "know" – recognizing the value of considering that solutions to problems in real-world contexts are context specific.

In sum, when self-directed learning is considered as a pragmatic learning process (cf. Figure 1) it is feasible that creative solutions to life-centred problems may be generated. Thus, potentially, creative learning outcomes can be supported through pragmatic self-directed learning. In the following section educational activities that could enable creative learning outcomes through a pragmatic self-directed learning process are discussed.

5. Educational activities that can enable creative learning outcomes through a pragmatic self-directed learning process

The literature review process of the present paper drew out 16 studies that concerned a variety of educational activities that could support a pragmatic self-directed learning process and

creative learning outcomes (cf. Table 1). In each study, learners were tasked to solve or resolve authentic problems in real-world based contexts through an inquiry process. Educational activities in these studies comprised of three types: experiential learning; workplace simulations; and problem-, case-, and (e-) portfolio-based learning.

Taxonomy of educational activities	**Studies examined in the present literature review**
Experiential learning	Collins, Sibthorp, & Gookin, 2016; Fűz, 2018; Hou & Pereira, 2017; Karoff, Tucker, Alvarez, & Kovacs, 2017; Munge, Thomas, & Heck, 2018; Isaak, Devine, Gervich, & Gottschall, 2018; Jordan, Gagnon, Anderson, & Pilcher, 2018; Scogin, Kruger, Jekkals, & Steinfeldt, 2017
Problem-based learning	Srinivasan, Wilkes, Stevenson, Nguyen, & Slavin, 2007
Case-based learning	Ward, Gore, Hutton, Conway, & Hoffman, 2018; Srinivasan et al., 2007
Workplace simulations	Jossberger, Brand-Gruwel, van de Wiel, & Boshuizen, 2017
(E-) portfolio-based learning	Beckers, Dolmans, Knapen, & Merriënboer, 2019;

	Beckers, Dolmans, & Merriënboer, 2016; Kicken, Brand-Gruwel, van Merrienboer, & Slot, 2009; Mohamad, Embi, & Nordin, 2016

Table 1. Summary of educational activities that could promote a pragmatic self-directed learning process

In the empirical studies on experiential learning it was discussed that creative solutions were commonly generated through the process (e.g., Isaak et al., 2018; Scogin et al., 2017). Learners were placed physically, often in collaboration with others, in a contextually rich learning environment that represented an in-the-moment uncontrived real-world context, in which learners were required to generate and test solutions to problems in context (e.g., Karoff et al., 2017; Munge et al., 2018). Learners were involved socially, intellectually, and physically; supporting the embodied nature of the learning experience (Jordan et al., 2018). In these studies, it was evident that teachers engaged purposefully with learners to support the process by (1) helping with sourcing appropriate information (2) assuming a share of control of directing the learning process, and/or (3) being involved in the process of co-constructing meaning.

A teacher may support a self-directed learning process by providing learning resources or other forms of information (Morris, 2019a). Indeed, as per the conclusions of the historical study of Gibbons, Bailey, Comeau, Schmuck, Seymour, and Wallace (1980), individuals who are experts in their field, who are also competent self-directed learners, still benefit from proactively seeking information from other experts. Learner control of directing the learning process can be maintained if learners are proactive in seeking information from experts. Also, if a teacher provides information to learners, learner control of the learning process could be preserved if learners are critical about the suitability of the information – considering whether the information is useful for them in their process of solving or resolving their problem in

context. It is important therefore that learners are given the freedom to retain responsibility to determine whether or not the information could be used in the process of generating a solution.

The action of a teacher supporting learners in terms of assuming a share of control of directing the learning process could resemble the concept of scaffolding. The concept of scaffolding could be understood in terms of Vygotsky's (1978) concept of Zone of Proximal Development, the key idea being that what a learner can do with assistance today they will be able to do by themselves soon afterwards. Likewise, staged models of self-directed learning (e.g., Grow, 1991) have proposed that a teacher can support a learner by providing direction, but then the amount of teacher-direction can be tapered when a learner becomes competent in self-directed learning.

Furthermore, in regards to co-constructing meaning, Tan (2017) argued that self-directed learning is ultimately underpinned by a "shared moral vision" (p. 250) of the "individual" and the "collective" (p. 251). This followed the hypothesis of Garrison (1997): that in formal educational settings the teacher inevitably plays a very important collaborative role in assisting students to appreciate the need to consider "what counts as worthwhile knowledge" (p. 23). It was also evident in the above studies that other learners also played an important role in the process of co-constructing knowledge.

However, all of the above studies on experiential learning were in "out-of-classroom" settings such as in field trips, service learning, or work experience. These forms of learning emphasise the need to immerse learners directly in a contextually rich and uncontrived learning context. In doing so, solutions that are generated through the process can be tested against the problem in the real-world context (as per the model in Figure 1).

The importance of testing the solution against the problem in context is supported through recent evidence on embodiment from cognitive science (refer to Dijkerman & Lenggenhager, 2018 for a review). In this respect, Kiefer and Trumpp (2012) discussed the point that there is mounting evidence that cognition is based on recollections of sensing, and/or feeling/acting that accompanied the original embodied experience. Thus, sensory-motor information becomes embodied in memory traces when learners are immersed physically in the problem context, and it is thought that embodiment is essential for deep conceptual understanding.

In the context of the present paper, this is especially relevant because perhaps without experiencing the problem in the real-world context, a *whole* grasp of what the problem is may not be gained. Furthermore, evaluation of the value of a solution generated through the learning process may not be fully possible unless it is tested against the problem in a real-world context (cf. Figure 1). In this regard, some educational activities are designed to bring authentic problem solving into classroom settings.

For instance, Jossberger et al. (2017) highlighted the potential for workplace simulations to facilitate self-directed learning as part of a pragmatic learning process. The authors pointed out that in vocational education and training of adults in the Netherlands there has been a shift away from theoretical domain-specific knowledge taught in classrooms because it presented a problem of knowledge and skill transfer. In particular, the authors identified the point that workplace simulations, which comprise of domain-specific, whole and authentic complex learning tasks, have been trialled in many institutions, but the didactical understanding of facilitating workplace simulations has, to date, not been properly worked out. In this regard, further empirical studies could examine whether workplace simulations could be didactically guided by The Pragmatic Learning Process Model (Figure 1).

In addition, it is possible that case- and problem-based learning may also facilitate a pragmatic self-directed learning process, whilst potentially enabling creative learning outcomes. In this respect, Srinivasan et al. (2007) identified problem-based learning as being a more open form of inquiry where students often undertake an active role in seeking information (including from the teacher) to create solutions to problems. Moreover, students assume control of directing the learning process, but teachers provide support in terms of co-constructing what is considered as relevant knowledge.

In case-based learning the teacher provides more support (cf. Ward et al., 2018). In what could be termed a "guided inquiry approach", in case-based learning the teacher provides information that is relevant in order to assist learners in the process of generating solutions and also helps by providing some direction in terms of meaning-making – regarding what is considered as "relevant" knowledge (Srinivasan et al., 2007).

In sum, both case- and problem-based learning are inquiry-based forms of learning that may enable a pragmatic self-directed learning process (cf. Figure 1). But, both of these forms of learning are supported differentially by the teacher: in terms of helping with sourcing appropriate information, helping with the process in terms of providing direction, and being involved in the process of co-constructing meaning.

Finally, in a recent systematic review Beckers et al. (2016) identified (e-) portfolios as potentially useful to facilitate self-directed learning. Mohamad et al. (2016) also highlighted the potential for e-portfolios to support a constructivist approach to learning and to stimulate creative learning outcomes. Thus, some forms of (e-) portfolios could potentially support self-directed learning as part of a pragmatic learning process.

Moreover, in terms of learner support, through a mixed-method study on the effectiveness of employing e-portfolios in Dutch vocational education and training, Beckers et al. (2019)

proposed that too much or too little learner support can hamper the effectiveness of the self-directed learning process. The authors identified feedback given by teachers (which could be regarding the information seeking process, directing the learning process, and/or the co-constructing meaning process) as essential to support self-directed learning, but requires much time and energy on the part of the teacher. This idea is also supported by previous empirical studies which have concluded that self-directed learning is often not successful or efficient without teacher support (e.g., Kicken et al., 2009).

6. Three distinct dimensions of teacher support

The analysis presented in the present paper suggests that creative learning outcomes are potentially supported through self-directed learning and teacher-direction (refer to Figure 2). Importantly, teachers can provide support to learners in different ways. In the studies examined in the previous section of the present report teacher support was advantageous for many learners.

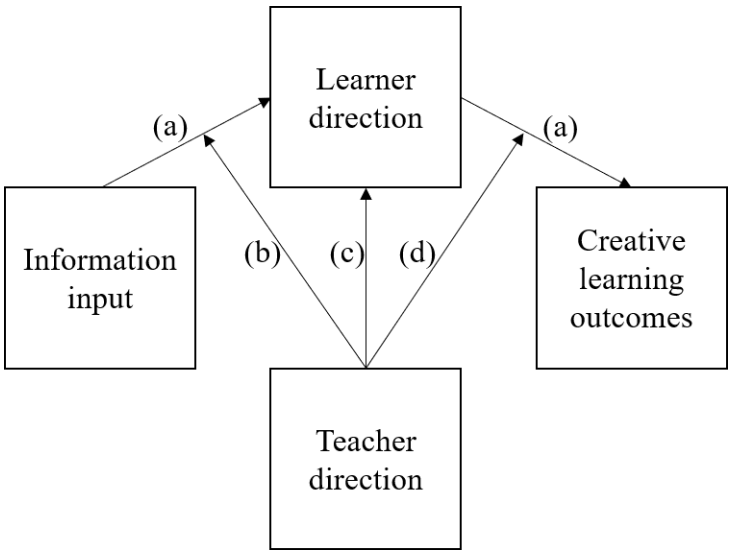

Figure 2. The three distinct dimensions of teacher support[1]

Figure 2 depicts a summary of the possible ways a teacher may support a process of self-directed learning. Figure 2 shows that creative learning outcomes are supported when learners assume control of directing their learning process (Figure 2; arrows a). In addition, in context of the present paper – in which self-directed learning is conceptualised as a pragmatic process (cf. Figure 1) – teacher-direction may support the learner in three distinct ways:

- Upon the process of information input (Figure 2; arrow b), which concerns whether the teacher provides support in terms of the process of seeking information relevant to the learning objectives;
- Directly upon learner control of directing the learning process (Figure 2; arrow c), which concerns whether the teacher provides scaffolding to support the process of learners directing their learning process (i.e., whether the learning objectives are suitable and whether the means of learning are fitting for achieving the learning objectives); and/or,
- Upon the process of (co-) constructing meaning (Figure 2; arrow d), which concerns whether the teacher provides support in terms of meaning-making (i.e., relative to the learning objectives, whether the learning outcomes are successfully and efficiently derived).

When interpreting Figure 2 it seems essential to consider that factors within the localised learning context may potentially influence the possibility and effectiveness of facilitating self-directed learning in formal educational settings. Contextual factors that might have an influence include the governing educational framework, the educational institutional tendencies and values, the varied nature and demands of different vocations, and the personality characteristics

and perspectives of the teacher and learners towards self-directed learning (e.g., Nasri, 2017; Slater, Cusick, & Louie, 2017).

There are a number of important directions for further research. Further research is required to examine whether the activities discussed in the present paper, which can enable creative learning outcomes, actually lead to an improvement in creative competence over time. Longitudinal studies could examine this possibility. Furthermore, as outlined in the introduction of this report, the bidirectional possibility that creative learners are more likely to produce creative learning outcomes in these educational activities was not considered in the present research and remains an important research direction. Also, it is important to note that it is probable that there are more classifications of educational activities not identified in the present literature review that might support a pragmatic self-directed learning process and creative learning outcomes. Nonetheless, the three distinct dimensions of teacher support identified in the present paper (cf. Figure 2) are important to consider in further studies on self-directed learning, especially given that Beckers et al. (2019) likened teacher facilitation of self-directed learning to "walking a tightrope" (p. 1).

7. Conclusion

Self-directed learning and creativity are critical workplace competences that are necessary to foster in formal educational settings. Self-directed learning and creativity are especially relevant in working fields in which employees are constantly faced with the need to solve problems, particularly in working environments where social contextual conditions are rapidly changing. In this regard, the present paper is likely to be of interest to a variety of educational stakeholders

– especially stakeholders who endeavor to cultivate creativity and self-directed learning competence within education.

The purpose of the present paper was to examine through a literature review the didactical possibility that creative learning outcomes are supported through a self-directed learning process. Adult self-directed learning commonly represents a process of solving or resolving real-world work- or life-centred problems: a pragmatic process (cf. Figure 1, The Pragmatic Learning Process Model). In this regard, for an adult learner creativity is sometimes a distinct advantage because a creative solution could be judged as the most successful and efficient learning outcome for a given life- or work-centred problem.

A variety of educational activities that promote a pragmatic self-directed learning process and creative learning outcomes are discussed in the present paper, including experiential learning, workplace simulations, and problem-, case-, and (e-) portfolio-based learning. In these activities, teacher support seems advantageous for many learners. In this respect, teachers may support learners in their self-directed learning in three distinct ways (cf. Figure 2): by (1) helping with sourcing appropriate information; (2) assuming a share of control of directing the learning process (determining the objectives and means of learning); and/or (3) being involved in the process of co-constructing meaning. These three distinct dimensions of teacher support should be considered in further empirical studies on self-directed learning.

Note

1. Creative learning outcomes are potentially supported through learner-direction of the learning process (Figure 2: arrow a). This process is supported through teacher-direction

in three ways: Firstly, upon the process of information input (arrow b); secondly, directly upon control of direction of the learning process (arrow c); and/or thirdly, upon the process of (co-) constructing meaning (arrow d).

References

Arnold, R., Nolda, S., & Nuissl von Rein, E. (Eds.) (2010). *Wörterbuch erwachsenenbildung* [Dictionary of adult education]. Tübingen: UTB.

Barnes, M. E. (2016). The student as teacher educator in service-learning. *Journal of Experiential Education*, *39*, 238-253. doi:10.1177/1053825916643831

Beckers, J., Dolmans, D. H., Knapen, M. M., & van Merriënboer, J. J. (2019). Walking the tightrope with an e-portfolio: imbalance between support and autonomy hampers self-directed learning. *Journal of Vocational Education & Training*, *71*, 260-288. doi:10.1080/13636820.2018.1481448

Beckers, J., Dolmans, D., & van Merriënboer, J. (2016). e-Portfolios enhancing students' self-directed learning: A systematic review of influencing factors. *Australasian Journal of Educational Technology*, *32*, 32-46. doi:10.14742/ajet.2528

Clain, A. (2016). Challenges in evaluating the EU's lifelong learning policies. *International Journal of Lifelong Education*, *35*, 18-35. doi:10.1080/02601370.2015.1125395

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.

Davis, M. (2012). A plea for judgment. *Science and Engineering Ethics*, *18*, 789-808. doi:10.1007/s11948-011-9254-6

Dewey, J. (2013). *Essays in experimental logic*. Mineola, NY: Dover Publications. (Original work published 1916).

Dijkerman, C., & Lenggenhager, B. (2018). The body and cognition: The relation between body representations and higher level cognitive and social processes. *Cortex, 104*, 133-139. doi:10.1016/j.cortex.2018.06.001

Duffy, G., & Bowe, B. (2010). A strategy for the development of lifelong learning and personal skills throughout an undergraduate engineering programme. In *Transforming Engineering Education: Creating Interdisciplinary Skills for Complex Global Environments, 2010 IEEE* (pp. 1-14). IEEE.

European Commission. (2015). *Unleashing young people's creativity and innovation: European good practice projects*. Luxembourg: Publications Office of the European Union. Retrieved from http://ec.europa.eu/assets/eac/youth/library/publications/creativity-innovation_en.pdf

Finnegan, F., Valadas, S., O'Neill, J., Fragoso, A., & Paulos, L. (2019). The search for security in precarious times: non-traditional graduates perspectives on higher education and employment. *International Journal of Lifelong Education, 38*, 157-170. doi:10.1080/02601370.2019.1567613

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly, 48*, 18-33. doi:10.1177/074171369704800103

Gibbons, M., Bailey, A., Comeau, P., Schmuck, J., Seymour, S., & Wallace, D. (1980). Toward a theory of self-directed learning: A study of experts without formal training. *Journal of Humanistic Psychology, 20*, 41-56. doi:10.1177/002216788002000205

Giroux, H.A., & Schmidt, M. (2004). Closing the achievement gap: A metaphor for children left behind. *Journal of Educational Change, 5,* 213-228. doi:10.1177/0896920516649418

Grow, G. O. (1991). Teaching learners to be self-directed. *Adult Education Quarterly, 41,* 125-149. doi:10.1177/0001848191041003001

Guglielmino, L. M. (2008). Why self-directed learning? *International Journal of Self-Directed Learning, 5*(1), 1-14. Retrieved from https://www.sdlglobal.com/journals

Guglielmino, L. M., Long, H. B., & Hiemstra, R. (2004). Self-direction in learning in the United States. *International Journal of Self-Directed Learning, 1*(1), 1-17. Retrieved from https://www.sdlglobal.com/journals

Isaak, J., Devine, M., Gervich, C., & Gottschall, R. (2018). Are we experienced? Reflections on the SUNY experiential learning mandate. *Journal of Experiential Education, 41*, 23-38. doi:10.1177/1053825917740377

Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. II, pp. 215-239). Mahwah, NJ: Lawrence Erlbaum.

Jordan, K. A., Gagnon, R. J., Anderson, D. M., & Pilcher, J. J. (2018). Enhancing the college student experience: Outcomes of a leisure education program. *Journal of Experiential Education, 41*, 90-106. doi:10.1177/1053825917751508

Jossberger, H., Brand-Gruwel, S., van de Wiel, M. W., & Boshuizen, H. (2017). Learning in workplace simulations in vocational education: A student perspective. *Vocations & Learning, 11,* 179-204. doi:10.1007/s12186-017-9186-7

Karoff, M., Tucker, A. R., Alvarez, T., & Kovacs, P. (2017). Infusing a peer-to-peer support program with adventure therapy for adolescent students with autism spectrum disorder. *Journal of Experiential Education, 40,* 394-408. doi:10.1177/1053825917727551

Kicken, W. S., Brand-Gruwel, S., van Merrienboer, J. J., & Slot, W. (2009). The effects of portfolio-based advice on the development of self-directed learning skills in secondary vocational education. *Educational Technology Research & Development, 57,* 439-460. doi:10.1007/s11423-009-9111-3

Kiefer, M., & Trumpp, N. M. (2012). Embodiment theory and education: The foundations of cognition in perception and action. *Trends in Neuroscience and Education, 1*, 15-20. doi:10.1016/j.tine.2012.07.002

Kirwan, J. R., Lounsbury, J. W., & Gibson, L. W. (2010). Self-directed learning and personality: The big five and narrow personality traits in relation to learner self-direction. *International Journal of Self-Directed Learning*, *7*(2), 21-34. Retrieved from https://www.sdlglobal.com/journals

Kirwan, J. R., Lounsbury, J. W., & Gibson, L. W. (2014). An examination of learner self-direction in relation to the big five and narrow personality traits. *SAGE Open, 4*(2), 1-14. doi:10.1177/2158244014534857

Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Chicago, IL: Follett.

Knowles, M. S. (1980). *The modern practice of adult education: From pedagogy to andragogy* (revised and updated). New York, NY: Cambridge.

Kolb, A. Y., & Kolb, D. A. (2013). *The Kolb Learning Style Inventory 4.0: A comprehensive guide to the theory, psychometrics, research on validity and educational applications*. Philadelphia, PA: Hay Group.

Lee, C., Yeung, A. S., & Ip, T. (2017). University English language learners' readiness to use computer technology for self-directed learning. *System, 67*, 99-110. doi:10.1016/j.system.2017.05.001

Lindeman, E. C. (1926). *The meaning of adult education*. New York, NY: New Republic.

Lundvall, B. Å., & Rasmussen, P. (2016). Challenges for adult skill formation in the globalising learning economy – a European perspective. *International Journal of Lifelong Education, 35*, 448-464. doi:10.1080/02601370.2016.1203364

Ma, X., Yang, Y., Wang, X., & Zang, Y. (2018). An integrative review: Developing and measuring creativity in nursing. *Nurse Education Today, 62*, 1-8. doi:10.1016/j.nedt.2017.12.011

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide*. San Francisco, CA: Jossey-Bass.

Mishra, P., Fahnoe, C., & Henriksen, D. (2013). Creativity, self-directed Learning and the architecture of technology rich environments. *TechTrends, 57*, 10-13. doi:10.1007/s11528-012-0623-z

Mishra, P., Henriksen, D., and Group, D. P. R. (2013). A NEW approach to defining and measuring creativity: rethinking technology & creativity in the 21st century. *TechTrends, 57*, 10–13. doi:10.1007/s11528-013-0685-6

Mohamad, S. N. A., Embi, M. A., & Nordin, N. M. (2016). E-portfolio reflective learning strategies to enhance research skills, analytical ability, creativity and problem-solving. *Asian Social Science, 12,* 228. doi:10.5539/ass.v12n10p228

Morris, T. H. (2018). Vocational education of young adults in England: A systemic analysis of teaching-learning transactions that facilitate self-directed learning. *Journal of Vocational Education & Training, 70,* 619-643. doi:10.1080/13636820.2018.1463280

Morris, T. H. (2019a). Adaptivity through self-directed learning to meet the challenges of our ever-changing world. *Adult Learning, 30,* 56-66. doi:10.1177/1045159518814486

Morris, T. H. (2019b). Experiential learning – a systematic review and revision of Kolb's model. *Interactive Learning Environments*. Advance online publication. doi:10.1080/10494820.2019.1570279

Morris, T. H. (2019c). Self-directed learning: A fundamental competence in a rapidly changing world. *International Review of Education, 65,* 633-653. doi:10.1007/s11159-019-09793-2

Munge, B., Thomas, G., & Heck, D. (2018). Outdoor fieldwork in higher education: Learning from multidisciplinary experience. *Journal of Experiential Education, 41,* 39-53. doi:10.1177/1053825917742165

Nasri, N. M. (2017). Self-directed learning through the eyes of teacher educators. *Kasetsart Journal of Social Sciences*. Advance online publication. doi:10.1016/j.kjss.2017.08.006

Oddi, L. F. (1986). Development and validation of an instrument to identify self-directed continuing learners. *Adult Education Quarterly, 36,* 97-107. doi:10.1177/0001848186036002004

Perry, M., & Collier, D. R. (2018). What counts as creativity in education? An inquiry into the intersections of public, political, and policy discourses. *Canadian Journal of Education, 41*(1), 24-43.

Robinson, K. & Aronica, L. (2009). The element. New York: Viking.

Scogin, S. C., Kruger, C. J., Jekkals, R. E., & Steinfeldt, C. (2017). Learning by experience in a standardized testing culture: Investigation of a middle school experiential learning program. *Journal of Experiential Education, 40,* 39-57. doi:10.1177/1053825916685737

Scott, P. (2018). Compliance and creativity: Dilemmas for university governance. *European Review, 26*(S1), S35-S47. doi:10.1017/S1062798717000527

Slater, C. E., Cusick, A., & Louie, J. C. (2017). Explaining variance in self-directed learning readiness of first year students in health professional programs. *BMC Medical Education, 17*, 207. doi:10.1186/s12909-017-1043-8

Srinivasan, M., Wilkes, M., Stevenson, F., Nguyen, T., & Slavin, S. (2007). Comparing problem-based learning with case-based learning: effects of a major curricular shift at two institutions. *Academic Medicine, 82,* 74-82. doi:10.1097/01.ACM.0000249963.93776.aa

Tan, C. (2017). A Confucian perspective of self-cultivation in learning: Its implications for self-directed learning. *Journal of Adult and Continuing Education, 23,* 250-262. doi:10.1177/1477971417721719

Tomczyk, Ł., Vanek, B., Pavlov, I., Karikova, S., Biresova, B., & Kryston, M. (2018). Critical thinking, problem-solving strategies and individual development assessment among

NEETs–research conducted in Slovakia, Poland and Estonia. *International Journal of Lifelong Education*, *37*, 701-718. doi:10.1080/02601370.2018.1550446

Tough, A. M. (1971). *The adults' learning projects: A fresh approach to theory and practice in adult education*. Retrieved from http://ieti.org/tough/books/alp.htm

Van Rensburg, G. H., & Botma, Y. (2015). Bridging the gap between self-directed learning of nurse educators and effective student support. C*urationis*, *38*, 1-7. doi: 10.4102/curationis.v38i2.1503

Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.

Ward, P., Gore, J., Hutton, R., Conway, G. E., & Hoffman, R. R. (2018). Adaptive skill as the conditio sine qua non of expertise. *Journal of Applied Research in Memory and Cognition*, *7*, 35-50. doi:10.1016/j.jarmac.2018.01.009