

Chapter 2

Learning 3.0: Rhizomatic Implications for Blended Learning

Johannes C. Cronje

Abstract In a Web 3.0 environment everybody is a producer of knowledge. This means that our learners are automatically also producers of knowledge. In the age of smart devices many of the skills we have been expecting learners to know, have become automated or obsolete. Google Translate means that it is no longer necessary to learn a foreign language before you travel. Google maps means you no longer need to read an atlas. So, as our devices are becoming smarter, we need to re-define what it means to learn. This paper will consider the use of Rhizome Theory to explore the multiple faces of learning in the twenty-first century, and propose an integrated framework for designing rhizomatic learning experiences.

1 Introduction

In a world where *Google* knows what you are asking even before you have finished typing the question becomes, “What is left to learn?”

This paper contains my reflections after a presentation on the topic at a plenary session of the Educational Technology World Conference, Bali from 31 July to 3 August, 2016. The presentation took the form of an interactive Bring Your Own Device (BYOD) activity and thus there was no written text. Now, 6 months later, I am sitting in Pretoria, South Africa reflecting on the thinking that led up to that conference and on how my thinking has been shaped since. I do many similar presentations and thus there may be significant overlaps with other of my work. I therefore request the reader to see this as a bricolage assembled from previous work, rather than as an original piece.

J.C. Cronje (✉)

Cape Peninsula University of Technology, Dean’s Office, 80 Roeland Street,
Cape Town 8001, South Africa

e-mail: johannes.cronje@gmail.com; <https://sites.google.com/site/johannescronje/>

There are many definitions of learning, (Malamed, 2016) but a rough synthesis of them all could be: *Learning is being able to do something afterwards that you could not do before*. The main problem with this definition is that, thanks to technology, there are numerous things we are now able to do, which we were not able to do before—such as navigate through traffic taking the optimal route in real time by using GPS, or recognize a piece of music never heard before using *Shazam*, or tell the distance to the flag on a golf course by pointing a cell phone at it. Even converting from one currency to another, taking into account the rate of exchange at any given date, can be done from an internet-enabled cell phone without any calculations. With every new app downloaded to a smartphone a learner can do something new, without having engaged in any mental effort. So from “what is left to learn?” we move to “what should we teach?”

In response to this question Tony Wagner, as early as 2008, made a proposal to help learners achieve seven “survival skills”, viz. *Critical Thinking and Problem Solving, Collaboration and Leadership, Agility and Adaptability, Initiative and Entrepreneurialism, Effective Oral and Written Communication, Accessing and Analyzing Information, and Curiosity and Imagination* (Wagner, 2008). For Wagner then it is not the person with the best technology. It is the person with the best technology who knows how (and when) to use it that is most likely to be able to do all these things. Dave Cormier and Bonnie Stewart move closer when they argue that we live in a *rhizomatic* age (D. Cormier & Stewart, 2010).

In this paper, I argue that rhizomatic learning is not so much a matter of learners having to adjust to a hyper connected world, but rather it is that the locus of learning has shifted from the learner to the rhizome. Before the ubiquity of the Internet the knowledge bottleneck was at the duplicating room. Learners could only be expected to learn as much as teachers could duplicate. Now the bottleneck sits between the ears of the learners. Learners can only learn as much as they can take in. However, in the connected rhizomatic world, the whole system is learning and thus what we have to do is connect and ride along. There needs to be a shift in emphasis from evaluating the learner’s *load* of knowledge, skills and attitudes to evaluating the learner’s *connection* to the system in which they survive using Wagner’s skills.

Learning in the twenty-first century has also been called *Learning 3.0* hinting at learning in a Web 3.0 environment (Rubens, Kaplan, & Okamoto, 2014). In a Web 1.0 environment information is presented by the provider to the user on a static web page. Web 2.0 is the social web where users provide information and interact with information of other users through social media such as blogs, and social sites such as *LinkedIn*, *Facebook*, and *Twitter*. Web 3.0 brings the inclusion of the *device* and the *system* as partners in the production of information. When a Web 3.0 user uses an Internet-enabled device to search information on *Google* for instance, then the user’s current and previous behaviour, as well as the location of the device, is factored into the search and in that way the user, the device and *Google* have obtained more information. Thus, the more users use their devices, the more *Google* learns about them, and the more able they become to do things that they were not able to do before.

2 Rhizome Theory

Rhizome theory (Deleuze & Guattari, 1987) argues that knowledge is better represented by a web structure than by a tree structure. Where most of our information comes from the World Wide Web a web makes a strong metaphor for knowledge and learning. A tree structure implies a hierarchy with something at the top and some root structure the rhizome implies a non-hierarchical, flat structure that favours organic growth above one of causality and chronology. In fact, the rhizome *becomes* the curriculum (D. Cormier, 2011). The link between Learning 3.0 and the rhizome is clear. There are no hierarchies. The learner, the system and the device are equal partners. The movement is multi-directional and occurs at the time of need, rather than at a time specified by a curriculum.

2.1 *Rhizomatic Implications for Learning 3.0*

Six principles govern the rhizome: Connection, heterogeneity, multiplicity, asignifying rupture, cartography and decalcomania (Deleuze & Guattari, 1987). It stands to reason that the survival skills of twenty-first century learners need to be measured against the extent to which they accommodate, or even exploit the rhizome.

2.1.1 Connection

Connection implies that “... any point of a rhizome can be connected to any other, and must be” (Deleuze & Guattari, 1987, p. 7). For Twenty-first Century learning this means that learners, teachers, information and technological devices are all connected. Moreover, there are no discrete knowledge areas. All knowledge is connected to all other knowledge. The principle of connection resonates with the educational theory of connectivism, which argues that:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making itself is a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision (Siemens, 2005).

In a world where people's attention is constantly distracted by the multiple stimuli that confront them we need to teach them how to cope with the multi-sensory connected world.

2.1.2 Heterogeneity

Where the industrial age brought with it the idea of batch processing and a desire for homogeneity, the information age has given us the ability to deal with diversity. This section will consider diversity in demographics, interest and learner characteristics.

The Organisation for Economic Co-operation and Development (OECD) shows a major shift in student demographics since 1995. Student numbers in OECD countries have grown from 39% to 60%. The average age of students varies from lower than 19 (Belgium, Japan and Indonesia) years, to over 25 (Iceland, New Zealand and Sweden). There is a strong growth in women entering higher education and generally the percentage of students who study outside their own countries has doubled to 4%. Social sciences, Business and Law are the most popular fields and Science Technology Engineering and Mathematics are the least popular fields (OECD, 2013).

In recent years, much research has been done on learner characteristics, such as learning style (Kolb & Kolb, 2013), cognitive style (Kozhevnikov, Evans, & Kosslyn, 2014), multiple intelligences (Gardner, 2011), emotional intelligence (Goleman, Boyatzis, & McKee, 2013) learning preferences (Fleming, 1995; Vark Learn Limited, 2015) and brain profile (Herrmann, 1995). Nevertheless, there seems to be very little evidence supporting the hypothesis that matching a learner's style will lead to improved performance (Klein, 2003; Pashler, McDaniel, Rohrer, & Bjork, 2008). Very recently, it was shown that individual differences do not lead to differences in decision making (Galotti, Tandler, & Wiener, 2014). Nevertheless although accommodating individual differences may not significantly improve results, it may well add to learners' enjoyment or motivation to learn and in that way lead to attitudinal, rather than scholastic improvement (Dunn & Dunn, 1993; Schick, 1979).

Heterogeneity in education has a number of advantages. It gives access to more students, teaches tolerance and respect for the 'other', encourages cooperation and mutual help, allows for the development of richer personal resources and challenges teacher development (Class & Class, n.d.). It has been found that dealing with heterogeneous groups by ability grouping has a significant effect when high achievers are grouped together and given enriched learning, but no improvement has been shown for low-achieving groups (Good, 1997; Kulik & Kulik, 1982). Another way of dealing with such diversity has been to adjust for individual needs, which seems impractical. A solution lies in creating a context in which a class is seen as a group of individuals who make their own meaning (Millrood, 2002). Such a context is created by keeping students motivated through variation and interest, reaching individuals by collaboration, individualisation and personalisation, and providing for different levels by open-ended assignments and providing a variety of compulsory and optional work (Class & Class, n.d.).

The implications for teaching and learning for heterogeneity, is a move towards teaching for diversity. One needs to ask questions such as:

- Is the material adequate for the age of the learner?
- Has the instructional design accounted for language barriers?
- Have learners been asked to add personal value to the content based on their particular style or preference?
- Has the learning event encouraged learners to value the significance of the ‘other’?
- Is collaboration encouraged?

2.1.3 Multiplicity

In terms of Rhizome theory multiplicity holds that the multiple is the unit (Deleuze & Guattari, 1987). In other words, everything has a multiple. Bergson (2001) identifies two types of multiplicity: continuous and discrete multiplicities. Table 2.1 shows a comparison between the two types.

The types of multiplicity can be identified across various multiples. This paper will consider three multiples: Multiple lives, multiple devices and multiple truths.

In a world of ubiquitous connectedness and with the flat, rather than hierarchical structure of the rhizome the number of roles played by teachers and learners have both increased and blurred. Teachers have become learners—learning not only about the subject, but also about the learners. Galloway and Lesaux (2014) identify five roles of a twenty-first century teacher: Leader, teacher, diagnostician, colleague and change agent. It is therefore necessary to recognise the tensions that arise as teachers re-adjust to their changed position (Taylor, Klein, & Abrams, 2014). Learners, on the other hand, have as much access to Internet-based information as the teachers have, and thus have become teachers or themselves, their peers and their teachers. As their portfolios become digital rather than paper-based, so they become focused more on an online portfolio as an identity, rather than an archive; at the same time they become more future-focused, recognising the value of the portfolio as a way of getting a job (Bennett, Rowley, & Dunbar-Hall, 2014).

Table 2.1 Continuous and discrete multiplicities (Adapted from Bergson)

Continuous multiplicities	Discrete multiplicities
Differences in kind	Differences in degree
Divides only by changing in kind	Divides without changing in kind
Non-numerical—qualitative	Numerical—quantitative
Virtual differences	Actual differences
Continuous	Discontinuous
Succession	Simultaneity
Fusion	Juxtaposition
Duration	Space

Multiplicity in devices is both continuous and discrete. There are numerous devices that can perform the same functions, and one device can perform numerous functions. Thus, for instance one can use a smartphone, a tablet, an e-reader, a computer or a printer to read a document. Then again one can use a smartphone to make and receive voice calls, read emails, send text messages, communicate on social networks, perform calculations, listen to voice and music and watch videos. The divergence and simultaneous convergence of technology has enabled the multiple to be the one, and the one to be the multiple. Multiplicity brings with it complication as well as simplicity. Life is simplified since at any given time one can perform any given function with whatever device is handy. Life is complicated since one has to navigate the complexity of various devices and platforms with which a task can be done.

The rhizomatic nature of knowledge has meant that there are numerous ways to arrive at information. Nevertheless there are also multiple truths, and it is may be difficult to distinguish between options. On the other hand, two different truths may hold for the same situation under different circumstances, as is shown by the two explanations of the shape of the Fish River in Namibia in Fig. 2.1.

The mythological explanation for the shape of the river is placed first—that it was shaped by a snake trying to escape from San hunters. The scientific explanation, that it flows on a low-gradient plane without direction is second. Although this is a humorous dichotomy, there are some that are more serious—particularly those that are subject to scientific debate while having life-changing implications for the rest of us: Is the Banting diet good or bad? Is there a relationship between high-cholesterol foods and heart disease?

The implication of multiplicity is that the teacher needs to understand that there are many interpretations to learning materials, and many applications of what is to be learnt. The purpose of facilitating learning is to address as many as possible of the multiple identities of the learner. What should be addressed is the learner's ability to manipulate various devices across various platforms to reach specific objectives or achieve particular outcomes. The learner should be taught to balance

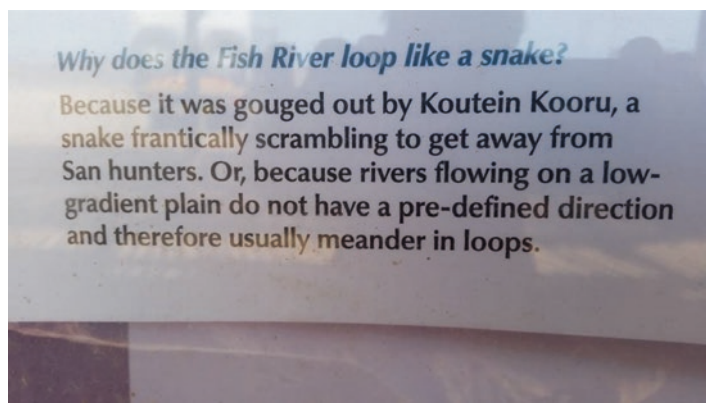


Fig. 2.1 Why does the Fish River loop like a snake?

efficiency and effectiveness by selecting the optimal tool for a given task. Moreover, the learner should be taught to cope with the information overload which results from the redundancy inherent in multiplicity.

The learner should be taught to distinguish the truth in a given context, and the teacher needs to realize that the result of an assessment of such learning is but one truth out of many others that exist simultaneously.

2.1.4 Assignifying Rupture

Whenever a piece of the rhizome breaks off it begins to grow afresh. Every piece of knowledge has the potential of growing into a new set of insights. The principle of transfer is not new in education, but in a rhizomatic environment it is central. “The transfer of learning is universally accepted as the ultimate aim of teaching” (McKeough, Lupart, & Marini, 2013, p. vii). Transfer, however, is always difficult to measure (S. Cormier & Hagman, 2014). Aspects to consider in the discussion of transfer include the direction and the extent of transfer, as well as the nature of transfer, be it motor, cognitive or metacognitive (S. Cormier & Hagman, 2014). Gagné (1985) distinguishes between vertical transfer, where the subsequent skill depends directly on the acquired one, and lateral transfer, when the learner realises that a skill acquired in one field, can be used in another—such as fractions in a classroom translating to dividing slices of pie. Motor transfer relates to physical skills—whether weight lifting might lead to increased performance on the sports field, while cognitive transfer relates to knowledge and metacognitive transfer concerns attitudes.

The main problem in teaching for transfer is that the skills being taught may need to be developed outside of the environment in which they will be used. It is not possible to measure transfer in the classroom—it needs to be assessed in the workplace. Here is where portfolios, peer tutoring and workplace learning become important.

2.1.5 Cartography

The concept of cartography holds that the rhizome represents a map rather than a tracing. This means that each learner has an individual map and that one learner cannot trace another’s map. Recently, the mapping of understanding as a form of learning has become very popular. It makes sense to use a map that shows connections when one deals with a connected environment. Davies (2011) distinguishes between mind maps, concept maps and argument maps, pointing out that each type may have a different application. Nevertheless for the sake of this paper the concept of getting a learner to draw a map linking various pieces of information is good enough.

Learners should be encouraged to generate their *own* maps, rather than simply to trace those that the teacher had drawn. Traditionally, a teacher would set learners a task of taking a piece of material and converting it into a map. Invariably such a map ends up with having the headings and sub-headings of the chapter as branching structures. The result is then a tree of knowledge, rather than a web of knowledge.

Instead, learners should be encouraged to have three foci in the map. They put themselves in the middle, the learning material to one side and the environment, both physical and intellectual on the other side. The map then shows the relationship between the learner, the material being learnt, other connected material and the environment in which the learner is. In this way no two maps can be the same, since no two learners are the same.

2.1.6 Decalcomania

Decalcomania refers to the production of endless series of repeating patterns that are usually fractal by nature. All learning, grammar, history, poetry, mathematics involves recognising the underlying patterns and how they repeat themselves, as well as the exceptions.

Learners need to be taught how to recognise patterns—and also distinguish between similar and dissimilar patterns. They also need to understand how those patterns develop over time, and what governs their formation. The patterns that learners need to recognise are not just subject-related. There are the cultural patterns in the community, and the patterns of behaviour expected from them in their place of learning. A good example of such pattern recognition beyond the textbook would be the school pupil who starts off looking exactly the same as all the others, but soon realises what it takes to become a part of the leadership group in the school. When that learner moves to another school or moves up to university it does not take long before he or she again fits into the leader group. It is a matter of recognising the pattern and emulating it.

3 Conclusion

Designing rhizomatic learning may be possible along a matrix where the principles of the rhizome are plotted against the desired outcomes and the resultant cells get populated with a substantiation of the learner's performance in a particular field. In this way the design is not hierarchical, but rather a flat plane describing the points where the best connections for a particular learner occur.

In this way Tony Wagner's (2008, 2012) survival skills could form the outcomes for which a rhizomatic learning event is designed. Table 2.2 shows how such a matrix could be assembled. Say, for instance, an instructor designs an assignment. The instructor can then consider the extent to which the principles of the rhizome can be matched with the survival skills. In the hypothetical situation contained in Table 2.2 the designer may have found that the principle heterogeneity should contribute to critical thinking and problem solving, since the learner will have to take a variety of different perspectives into account. The principle of connection will be useful in developing leadership, since the learner will have to deal with a group of associates in doing the assignment. The principle of multiplicity means that the learner has to be agile and adaptive. Since the learner has to produce an individual

Table 2.2 Proposed assessment matrix

	Connection	Multiplicity	Heterogeneity	Asignifying rupture	Cartography	Decalcomania
1. Critical Thinking and Problem Solving		x	x			
2. Collaboration and Leadership	x			x		
3. Agility and Adaptability		x				
4. Initiative and Entrepreneurialism					x	
5. Effective Oral and Written Communication	x					x
6. Accessing and Analyzing Information		x		x	x	
7. Curiosity and Imagination		x		x		x

assignment that was unlike any other, the work is a map, and not a tracing—following the principle of cartography. The learner has to develop patterns of communication and write the assignment according to a specific format. The endless transformation of assignments into the same format relates to the principle of decalomania. Assignifying rupture means that the information has to be accessed and analysed for its usefulness and transfer, as does obtaining the information through curiosity and imagination.

The table could be refined ever further if each cell were to be filled in with a narrative explaining how those aims will be achieved. Moreover, those cells where there are no overlaps could contain narrative explaining why such overlaps do not occur. Finally, of course, the various intersections could be linked up, and in that way could produce an actual rhizomatic sketch of the learning event.

4 Recommendations

The integrative matrix suggested in this paper is but one possible application of Rhizome theory to the design of learning in a Web 3.0 environment. Of course, it could well be possible to put any other set of outcomes on the vertical axis and determine the extent to which they have to be realized rhizomatically. Furthermore, the patterns that form when multiple learners work together and form their own maps could lead to even more complex descriptions. Traditional design is mainly nomothetic. The design first concentrates on the whole population, and then aims to plot the individual learner somewhere inside the bell curve during the assessment. Such an assessment, however, does very little in explaining the extent to which an individual learner has been able to cope with a particular context—and tells us nothing about how a learner's performance might change if the context changes. In essence what this article calls for is an ideographic design that accommodates of the rhizomatic nature of learners' personal learning situations, rather than a nomothetic rating of their performance in a standardized test. In this way then the design will shift from the *accumulation* of the learner's knowledge, to the *connection* of the various knowledges in the system.

Acknowledgements If you wish to acknowledge persons who contributed or sponsoring agencies, do so here in this optional section.

References

- Bennett, D., Rowley, J., & Dunbar-Hall, P. (2014). *Electronic portfolios and learner identity: An ePortfolio case study in music and writing*. Retrieved from <http://www.tandfonline.com/eprint/2ARXivQrDrrNw7yCr4ZQ/full>.
- Bergson, H. (2001). *Time and free will: An essay on the immediate data of consciousness*. Retrieved from https://books.google.co.za/books?hl=en&lr=&id=g_8JmPzRKaAC&oi=fnd&pg=PA1&

- dq=Bergson%27s+Essay+on+the+Immediate+Given+of+Awareness+&ots=0lk4NBhMM&sig=ScRmEDHUAZKg1FSMYyIeisk7CwE.
- Class, W., & Class, W. (n.d.). Teaching heterogeneous classes. *Upbo.org*. Retrieved from http://www.upbo.org/elt/rx_downloads/heterog2010ho.pdf.
- Cormier, D. (2011). *Rhizomatic learning-why we teach?* Retrieved March 30, 2016, from <http://davecormier.com/edblog/2011/11/05/rhizomatic-learning-why-learn/>.
- Cormier, D., & Stewart, B. (2010). Life in the open: 21st Century learning & teaching. *Atlantic Universities' Teaching Showcase*, 24.
- Cormier, S., & Hagman, J. (2014). *Transfer of learning: Contemporary research and applications*. Retrieved from https://books.google.co.za/books?hl=en&lr=&id=p_vSAwAAQBAJ&oi=fnd&pg=PP1&dq=teaching+for+transfer+of+learning&ots=sAJWzrYR7t&sig=vBPi_rAp_FEXUVIIyb5J2hGopXYQ.
- Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter? *Higher Education*, 62(3), 279–301.
- Deleuze, G., & Guattari, F. (1987). *A thousand plateaus: Capitalism and schizophrenia*. London: Athlone Press.
- Dunn, R. S., & Dunn, K. J. (1993). Learning styles/teaching styles: should they ... can they ... be matched? *Educational Leadership*, 37, 238.
- Fleming, N. D. (1995). I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom. In *Research and Development in Higher Education. Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia (HERDSA)*, HERDSA (Vol. 18, pp. 308–313).
- Gagné, R. M. (1985). *The conditions of learning and theory of instruction*. New York, NY: Holt, Rinehart and Winston.
- Galloway, E., & Lesaux, N. (2014). Leader, teacher, diagnostician, colleague, and change agent. *The Reading Teacher*, 67(7), 517–526. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/trtr.1251/full>.
- Galotti, K. M., Tandler, J. M., & Wiener, H. J. D. (2014). Real-life decision making in college students. II: Do individual differences show reliable effects? *The American Journal of Psychology*, 127(1), 33–42.
- Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic books.
- Goleman, D., Boyatzis, R., & McKee, A. (2013). *Primal leadership, with a new preface by the authors: Unleashing the power of emotional intelligence*. Boston, MA: Harvard Business Press.
- Good, T. (1997). Do students learn more in heterogeneous or homogeneous groups? *DOCUMENT RESUME ED 268 075 SP 027 044*. Retrieved from <http://files.eric.ed.gov/fulltext/ED268075.pdf#page=26>.
- Herrmann, N. 1995. *The creative brain*. (2nd ed). Kingsport: Ouebecor.
- Klein, P. D. (2003). Rethinking the multiplicity of cognitive resources and curricular representations: alternatives to 'learning styles' and 'multiple intelligences'. *Journal of Curriculum Studies*, 35(1), 45–81.
- Kolb, A., & Kolb, D. A. (2013). *Kolb learning style inventory: LSI workbook*. New York, NY: HayGroup.
- Kozhevnikov, M., Evans, C., & Kosslyn, S. M. (2014). Cognitive style as environmentally sensitive individual differences in cognition: a modern synthesis and applications in education, business, and management. *Psychological Science in the Public Interest*, 15(1), 3–33.
- Kulik, C., & Kulik, J. (1982). Effects of ability grouping on secondary school students: A meta-analysis of evaluation findings. *American Educational Research Journal*, 19, 415. Retrieved from <http://aer.sagepub.com/content/19/3/415.short>.
- Malamed, C. (2016). *10 definitions of learning*. Retrieved March 18, 2017, from <http://thelearningcoach.com/learning/10-definitions-learning/>.
- McKeough, A., Lupart, J., & Marini, A. (2013). *Teaching for transfer: Fostering generalization in learning*. Retrieved from <https://books.google.co.za/books?hl=en&lr=&id=GVFcAgAAQBAJ&oi=fnd&pg=PP1&dq=teaching+for+transfer+of+learning&ots=F17aMaLX2e&sig=nntYcKfpS22ScZR2dzwjJPvmNQw>.

- Millrood, R. (2002). Teaching heterogeneous classes. *ELT Journal*, 56, 128. Retrieved from <http://eltj.oxfordjournals.org/content/56/2/128.short>.
- OECD. (2013). How are university students changing? *Education Indicators in Focus*, 6(15), 1–4. Retrieved from <http://www.oecd.org/edu/skills-beyond-school/EDIF2013--N°15.pdf>.
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105–119.
- Rubens, N., Kaplan, D., & Okamoto, T. (2014). E-learning 3.0: Anyone, anywhere, anytime, and AI. In *New horizons in web based learning* (pp. 171–180). New York, NY: Springer.
- Schick, R. M. (1979). Teaching students through their individual learning styles: A practical approach. *NASSP Bulletin*, 63(428), 113.
- Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3–10.
- Taylor, M., Klein, E. J., & Abrams, L. (2014). Tensions of reimagining our roles as teacher educators in a third space: revisiting a co/autoethnography through a faculty lens. *Studying Teacher Education*, 10(1), 3–19. <http://doi.org/10.1080/17425964.2013.866549>.
- Vark Learn Limited. (2015). The VARK Questionnaire | VARK. Retrieved April 10, 2015, from <http://vark-learn.com/the-vark-questionnaire/>.
- Wagner, T. (2008). Rigor redefined. *Educational Leadership*, 66(2), 20–24.
- Wagner, T. (2012). Creating innovators: The making of young people who will change the world millennials AND edu. Retrieved from [/citations?view_op=view_citation&continue=/scholar?hl=de&start=30&as_sdt=0,5&scilib=1026&scioq=generation+AND+y+AND+education+AND+surgery&citilm=1&citation_for_view=KMG5z98AAAAJ:i2xiXl-TujoC&hl=de&oi=p](http://www.citings.com/citations?view_op=view_citation&continue=/scholar?hl=de&start=30&as_sdt=0,5&scilib=1026&scioq=generation+AND+y+AND+education+AND+surgery&citilm=1&citation_for_view=KMG5z98AAAAJ:i2xiXl-TujoC&hl=de&oi=p)

Johannes C. Cronjé is the Dean of Informatics and Design at the Cape Peninsula University of Technology. He was born in Davenport Iowa in 1959 when his parents were there doing more than just studying. At the age of 8 months he persuaded his parents to return to South Africa where he attended a die Laerskool Anton van Wouw and then Pretoria Boys High School where he matriculated in 1976. Following this he enrolled at the University of Pretoria where he obtained the BA majoring in Afrikaans, English, and Anthropology, the BA honours as well as a Teachers' diploma before reporting for military service at the Infantry School, Oudtshoorn. During his second year of national service he completed an MA in Afrikaans literature while serving on the Angolan border. He then taught English and Afrikaans at Pretoria Boys High until 1986 when he was appointed a lecturer in Language Communication at Technikon Pretoria. He obtained a Doctorate in Afrikaans Literature in 1990 and then a Masters Degree in Computer-Assisted Education from the University of Pretoria. From 1994 to 2007 he was a professor of computers in education with the University of Pretoria. He has also been a visiting professor at Sudan University of Science and Technology, Addis Ababa University, Ethiopia; the University of Joensuu, Finland, and the University of Bergen, Norway, The Katholieke Universiteit of Leuven, Belgium, The University of Namibia and the University of the Free State, South Africa. He has supervised or co-supervised 72 Masters and 55 Doctoral students and published more than 42 research papers. His hobbies include public speaking, road running, and dabbling in social media. He is married to Franci and they have three children, two dogs, and two cats.

Educational Technology to Improve Quality and Access
on a Global Scale

Papers from the Educational Technology World
Conference (ETWC 2016)

Persichitte, K.; Suparman, A.; Spector, M. (Eds.)

2018, XIII, 339 p. 39 illus., 26 illus. in color., Hardcover

ISBN: 978-3-319-66226-8