



An active learning intervention for in-service teachers: self-determination theory, heutagogy, neuroeducation and the (altered) flipped classroom in practice

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Abstract

Teachers often find it challenging to make the necessary mind shift to embrace alternative pedagogies, thereby reinforcing passive learning behaviours through an over-reliance on teacher-centred practices. This familiarity with traditional pedagogy has consequently served as a stumbling block for many educational innovations. Developing a context-specific pedagogical intervention that is (i) grounded in contemporary educational theory and (ii) can readily be implemented by everyday in-service teachers is imperative to escape the passive learning landscape. This conceptual paper aims to show how the Altered Flipped Classroom Pedagogy (AFCP) was developed to support in-service teachers with limited resources to explore a more learner-centred approach. The conceptualisation of the AFCP stems from the principles of heutagogy (a theory of learning), Self-determination theory (a macro-theory of motivation), the flipped classroom (an instructional strategy) and the fundamentals of neuroeducation research (an emerging discipline). The interrelation of these four concepts is key to having a better understanding of the importance of learner-centred pedagogies for 21st-century learning. The framework also sheds light on the internal properties necessary to actuate learners' self-determined behaviours, which in turn combats the passive learning phenomenon and empowers them for future learning paths.

Keywords Self-determination theory · Heutagogy · Neuroeducation · Flipped classroom · Active-learning intervention · Teacher training

Introduction

Although there has been a steady shift towards the implementation of learner-centred pedagogy over the last decade (Aubrey & Riley, 2015; Bremner et al., 2022; Sakata, 2023), the 21st-century educational landscape is in need of a radical shift (Qazaqovna, 2024) and systemic change (Verma,

2024). Active learning pedagogy has proven effective over traditional teacher-directed practices where content and knowledge are passively delivered (Aricò & Lancaster, 2018; Bates et al., 2017). Flamant et al. (2023) made a similar call to develop classroom interventions focusing on decreasing controlling teaching whilst promoting autonomy-supportive teaching. Problematic, however, is that contemporary educational practices often do not reflect what is currently known about active learning instructional strategies (Li et al., 2021), although these are known to stimulate deeper learning, which is in line with 21st-century learning outcomes (Narendran et al., 2018).

The passive learning phenomenon continues to thrive nationally and internationally in everyday classrooms (Kenwright et al., 2017; Sakata et al., 2022; Pretorius, 2023) as traditional classrooms tend to 'resist change' (Gündüz & Akkoyunlu, 2019; Plaisir, 2020). Increasing teacher age and teaching experience were also contributing factors (Lomba-Portela et al., 2022). Another is that national and/or

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institutional cultures do not support learner-centred education (Brinkmann, 2019; Lee, 2023). These ideas are often deeply rooted in perceptions of how adult-learner relationships should be constructed or longstanding examination regimes (e.g., High Stakes Testing) that reinforce rote-learning (Ryan & Deci, 2020; Schweisfurth, 2011). Attention should be given to the call by Barrenechea et al. (2022) to focus professional development on instructional strategies that positively impact learning, consider contextual factors and apply to real-life classrooms. Kim et al. (2019) similarly advocated for a shift in teacher pedagogy.

Developing a context-specific pedagogical intervention that is (i) grounded in contemporary educational theory and (ii) can readily be implemented by everyday in-service teachers is imperative to escape the passive learning landscape. Generally, pedagogies serve as a framework for teachers' decision-making about how they should teach. When introducing innovative pedagogies, existing ideas, educational tools, subject knowledge and practice are brought together in novel ways to solve problems when existing practice falls short of meeting educational needs (Peterson, 2018).

A pedagogic intervention was conceptualised and put forth that draws on flipped classroom research (an instructional strategy), heutagogy (a theory of learning), self-determination theory (theory of motivation within psychology) and principles of neuroeducation research (an emerging discipline). It is proposed that situating an intervention within this framework could influence teachers to more readily introduce learner-centred activities in their classes, thereby providing learners with an opportunity to actively engage in their process of knowledge construction and the development of key 21st-century skills. This aligns with Sumardi et al. (2020), who have highlighted the importance of aligning 21st-century teaching with the demands of 21st-century learning. Dubinsky et al. (2019) recommended policies that prioritise group work and active learning practices in the South African context, as these may positively affect the Annual National Assessments and the National Senior Certificate results.

Contextualising the problem

Within the South African school context, many challenges hinder the establishment of day-to-day active learning pedagogy. In 2015, the Department of Education set out 27 goals to achieve for Schooling 2030 (DBE, 2015). What is problematic is that none of these goals specifically refer to *how* teachers should teach. These goals also do not consider how teachers can create learning opportunities or environments to grow and develop their learners' critical and creative thinking skills. As we (South Africans) have learned from

our own historical experience through the implementation of Outcomes Based Education (OBE), it is important to introduce context-specific pedagogical interventions (World Bank, 2017).

From the vantage point of in-service teachers, concerns have been raised regarding curriculum coverage at the cost of quality learning and having to pace the speed of learning to the slowest learner (Bertram et al., 2021). Teachers may also unknowingly reinforce a 'passive learning culture' if they do not differentiate their pedagogical practice to include active learning opportunities that foster learner agency, leading to increased classroom interaction. The South African Curriculum and Assessment Policy Statement (CAPS) explicates principles such as 'active and critical learning', which denotes an engaged and active approach to learning. It also includes principles such as collaboration and higher levels of learner independence (Ojo & Mathabathe, 2021) and reinforces the importance of developing learners' ability to apply knowledge and problem-solve across various diverse contexts (Ajani, 2021). These principles form a stark contrast to the reality of the majority of high school environments.

The purpose of this article can be considered twofold. Firstly, it proposes a solution to a gap that was highlighted by Kanwar et al. (2013). In short, they stated that the National Qualifications Framework (on which the CAPS curriculum is based for the General Education and Training (Grades 1-9) and Further Education and Training (Grades 10-12) band) seems to be oriented more towards pedagogy and andragogy, whilst the focus on heutagogy, which encourages self-determined learning and learner autonomy, is limited. Although the South African Qualifications Framework has made an effort to address this by introducing new policy, implementation has not been as effective. Additionally, Kanwar et al. (2013) make a call for the capacity building of teachers and administrators to promote self-determined learning processes.

Secondly, the article seeks to design and develop a framework for an intervention that (i) aligns with the principles of the South African CAPS curriculum, (ii) is theoretically sound and situated within contemporary educational practices and (iii) can readily be translated to suit the praxis of in-service teachers in everyday classrooms in a developing country. It is therefore proposed that an intervention that naturally meets these three objectives may combat the passive learning phenomenon. This, however, is no small feat, as research has shown that the classroom realities of developing countries are prone to maintain a teacher-centred formalised pedagogy (Brinkmann, 2019; Sakata et al., 2022; Schweisfurth, 2011; Song, 2015).

Introducing the intervention

THE FLIPPED CLASSROOM

Traditionally, flipped classrooms are known for ‘moving’ teacher-led instruction ‘outside’ the classroom, freeing up classroom time inside the class for cooperative learning, teacher facilitation, individualised attention and guided learning (Bergmann & Sams, 2014; Hodges & Dubinski Weber, 2015; Lee, 2023). Flipped classrooms are traditionally introduced via an e-learning approach (online, pre-class and self-paced), which naturally relies on a steady and sufficient supply of digital resources for teachers and learners (Jacot et al., 2014; Lee, 2023).

The flipped classroom gained popularity as an instructional method as the advantages to the learning process outweighed the challenges when implementing the method of instruction. Overall, research has shown that it leads to improved learning performance (Akçayır & Akçayır, 2018) and develops students’ individuality across various skills and abilities (Gündüz & Akkoyunlu, 2019; Jdaitawi, 2019). Alternative positive outcomes also include increased levels of motivation and self-efficacy (Galindo-Dominguez, 2021; Algarni & Lortie-Forgues, 2023), increased ownership of one’s learning (Gündüz & Akkoyunlu, 2019) and an increase in active and/or interactive learning (Lee, 2023). The flipped classroom pedagogy also positively correlates to the affective domain, as the learning process is perceived as more enjoyable due to increased participation (Munir et al., 2018; Olakanmi, 2017). In addition, learning becomes more personal and as a result, students who tend to withdraw from a whole-class approach feel more comfortable approaching their teachers to ask questions (Ivala et al., 2013). This, again, may provide opportunities for those who may have become marginalised by a teacher-centred approach. In terms of skill development, there is ample research on the potential of the flipped classroom to develop key 21st-century skills such as problem-solving, creative thinking, communication, critical thinking, growing a sense of social awareness and being able to construct novel ideas for real-world problems (Al-Zahrani, 2015; Chen, 2016; Mitsiou, 2019; Munir et al., 2018; Wang, 2017). Flipped classroom research favours low performers, as these learners receive adequate support to grow their capacity to meet the faster pace of their peers (Sergis et al., 2018).

It is important to note that most studies have been conducted in university contexts, and research regarding the effectiveness of the flipped classroom in primary and high school classrooms is limited (Galindo-Dominguez, 2021). Although the majority of studies regarding the flipped classroom have advocated the positive outcomes of the instructional approach, Lee (2023) cautions by stating that in some

instances, successful implementation may be impeded by contextual factors.

Theoretical foundation

Common overarching themes from the widespread definitions of the flipped classroom include: (i) transmission of information is moved outside of class; (ii) class time is mainly allocated to active learning activities, and (iii) learners have to complete one or more pre-and/or post-class activities that are aligned with or build on the in-class work (Abeysekera & Dawson, 2015). To prevent misrepresentation or misconceptions regarding the pedagogy, the Flipped Learning Network identified Four ‘Pillars’ that provide guidelines to educators when implementing the pedagogy. The ‘F-L-I-P’ acronym was used to convey these pillars, which refer to Flexible environments, Learning Culture, Intentional content and Professional Educators (FLN, 2014).

The success and effectiveness of the flipped classroom as a didactic method cannot be explained independently from coalescing learning theories. The flipped classroom is fundamentally rooted in active learning theory (Kissi et al., 2017; Li et al., 2021) and combines theories previously believed to be incompatible (Bishop & Vergeleger, 2013). It encompasses pre-class, in-class and occasionally a post-class activity (Abeysekera & Dawson, 2015), where pre- and post-class activities are done individually, and in-class activities are completed with the help and support of peers and/or teachers.

The flipped classroom is principally founded on constructivist theories of learning (Eppard & Rochdi, 2017; Hsieh, 2017). The influence of cognitivist theories is also accounted for, as learners are still required to acquire certain bodies of knowledge (Abeysekera & Dawson, 2015), and these place a strong emphasis on the conceptualisation and basic acquisition of knowledge (Ertmer & Newby, 2013). Moreover, learners have to access and build on existing knowledge structures, whilst integrating novel information (Gilboy et al., 2015).

Depending on the teacher’s selection of in-class activities, these are generally grounded in socio-constructivist learning theories as learners engage with their peers and teacher in the learning activities (Hsieh, 2017). Via the Vygotskian perspective, learning is optimised when learners, through working collaboratively, enter their zone of proximal development, enabling them to acquire new information and solve problems that reach just beyond their ability (Eppard & Rochdi, 2017). These theories extend to other learner-centred theories, including peer-assisted learning, problem-based learning and cooperative learning (Bishop & Verleger, 2013; Reyna, 2015).

The ‘altered’ flipped classroom

As mentioned earlier, developing countries have unique contextual and historical challenges. Within the South African context, the traditional flipped classroom is currently not a viable solution to combat the passive learning phenomenon as it depends on internet access and connectivity. According to the latest available data from the Department of Education, only 21.48% of the public schools in the country have internet access for teaching and learning (DBE, 2023). Consequently, the traditional flipped classroom may advance the ‘digital divide’ between learners from higher and lower socio-economic backgrounds, furthering educational inequality in the country (Bates et al., 2017; Lee, 2023). This may also be one of the core reasons why teachers in developing countries have not readily adopted the flipped classroom, as online activities are perceived as mandatory for pre-class activities (Kissi et al., 2017).

‘Altering’ the flipped classroom was therefore seen as a probable solution to provide learners with the advantages of learning via this learner-centred pedagogy irrespective of socioeconomic status and availability of resources (e.g., internet access). This was achieved through designing a manual for in-service teachers, which consists of three main components: (i) real-life examples of how to adapt one’s existing resources to create pre-class, in-class and post-class activities that are not dependent on technology, (ii) providing an overview of existing active learning activities which can be used for in-class activities, and (iii) providing a research/theory-based rationale for introducing the ‘altered flipped classroom pedagogy’ (AFCP) as a means to combat the passive learning phenomenon.

NEUROEDUCATION

Neuroeducation, also known as educational neuroscience, is a field predominantly influenced by psychology, pedagogy and neuroscience (Gkintoni et al., 2023). The late 20th century saw a surge in this field of study, with particular attention to research and practice (Wilcox et al., 2021). Despite the apparent ontological differences, with neuroscience focusing on the brain’s dynamics at molecular and biological levels and pedagogy on developing educational teaching methods, it is still improbable that these differences will prevent the formation of an interdisciplinary coalition (Kaygısız, 2022).

Neuroeducation is briefly defined as “...an interdisciplinary branch that aims to incorporate insights regarding neural learning mechanisms into educational practice and policy” (Gkintoni et al., 2023, p. 146). The main objective is, therefore, to gain an awareness and deeper understanding of the various processes involved in the learning process that can

eventually be translated into pedagogical approaches (Tolmie, 2015). Due to the lack of a sound theoretical underpinning and meaningful connections between brain and cognitive function, neuromyths eventually emerged. Some have even referred to the application of findings from neuroscience to education as ‘a contentious topic’ (Privitera, 2021), whereas others have argued that enough attention has not been paid to ‘the application of neuroscience to education’ (Bruer, 2016). Neuroscientists were consequently forced to become more explicit in translating the research from neural functioning to learning (Tan & Amiel, 2022). Wilcox et al. (2021) recently stated that for educational neuroscience to emerge as a discipline in its own right, traditional methods and boundaries must be questioned and bridged, and a framework should be put in place that allows for a ‘collaborative and productive exchange’.

Teaching and learning are essentially neurobiological in nature (Owens & Tanner, 2017). Including and aligning neuroeducation with pedagogical interventions to inform and strengthen the everyday practice of in-service teachers is regarded as imperative as it sheds light on a deeper and more nuanced understanding of developing teaching practices that naturally align with how their learners learn. From the aforementioned, neuropedagogy has grown within the discipline of neuroeducation as a sub-discipline, which aims to transfer neurological discoveries to classroom contexts (Gejdoš, 2019). The potential of neuropedagogic practices has been recognised to bring about innovative contemporary teaching practices (Friedman et al., 2019). It can also inform teachers’ decision-making on (i) resource development, (ii) how to create safe learning spaces, and (iii) how to develop learner-specific interventions. Although some have stated that neuroscience and education are “...primarily intertwined and interact with the ultimate purpose of enhancing learning and teaching” (Gkintoni et al., 2023, p. 147), research on the implementation of neuropedagogical innovations within school contexts is still at an infant stage (Piddubna et al., 2023).

Neuroeducation and learning-centredness

A better understanding of the neurobiology of learning and the process of knowledge construction may provide teachers with the necessary explanations to transform their practices from teacher-centred to learner-centred (Dubinsky et al., 2019; Tan & Amiel, 2022). When teachers are introduced to the neuroeducation field, they develop a better understanding of the effectiveness of learner-centred learning (Schwartz et al., 2019). Moreover, researchers have openly stated that passive or traditional teacher-led methods of instruction do not affect the active construction or adapting of neural networks as these are constructed via dynamic

learner activity (Gejdoš, 2019). Elsewhere, Schwartz et al. (2019) mentioned that higher levels of learner agency positively translate to expanding neural networks. This leads to a richer understanding of the topic being studied as learners can link the new content to their existing memories and experiences. Abiola and Dhindsa (2012) found that learning occurs faster in an environment where learners are challenged, choice is offered, and learners feel welcome to give their opinions. Learner-centred learning activities provide learners with opportunities to alter their existing cognitive structures through exploration, reasoning and critical or creative thinking, and the increased levels of engagement and interaction ultimately counter the passive learning phenomenon. When superficial learning occurs, learning can not be modified or meaningfully applied to novel learning experiences (Banerjee, 2019). Learners also risk being on the receiving end of adopting the teacher's cognitive networks that are passively being transferred (Schwartz et al., 2019).

Neuroeducation and the flipped classroom

In Becker & Birdi (2018), stated that "...a better appreciation of how students learn" was one of two changes that have "...laid the ground for the emergence of the flipped classroom" (p. 2). In addition, the flipped classroom pedagogy has been recognised for its potential to contribute to learners' social, cognitive and sensory dimensions (Başaran, 2021). One of the key reasons for the positive learning outcomes is that attention is given to the activation of prior knowledge, which is often ignored when ad-hoc lessons are taught with the primary focus on transferring content. When learners' existing knowledge structures are activated, they can more readily integrate them with what is happening in class (Hase & Blaschke, 2021). This is also considered critical for 21st-century skill development and deeper learning as neural pathways are strengthened and refined once a link with learners' existing knowledge base is established (Pellegrino, 2017). The importance of optimising this process when introducing new concepts and content has been corroborated by in-service teachers who partook in a three-year Neuropedagogy Adaption Project (Friedman et al., 2019).

Teachers' neuroscientific literacy

The field of neuroscience is gaining attention as its potential to support theory-informed pedagogy and the professional development of teachers is recognised (Tan & Amiel, 2022). Having a basic level of neuroscientific literacy enables teachers to make knowledgeable decisions regarding their methods of instruction. It also enables them to examine the relationship between learners' learning, teaching and pedagogical decision-making (Tan & Amiel, 2022). This

translates into how they pace in-class learning experiences and provide opportunities for 21st -century skill-development during their lessons. Teachers may also have a well-founded insight into the cognitive processes of constructing new learning paths and learners' cognitive predispositions. An awareness of the prior may contribute to a more reflective practice where teachers deliberate the best course of action in their classes (Barabanova & Kazlauskiene, 2020). In addition, teachers may also have a more rounded mental framework of the various psychological factors that influence learner behaviour (Dubinsky et al., 2019). When teachers continue to develop their neuroeducational knowledge base, they give more significant consideration to individual learner needs, provide more accurate scaffolding and offer extended learning opportunities that may stimulate further growth and development (Dubinsky et al., 2019). Neuro-educational research can allow teachers to develop an evidence-based practice (Agonács & Matos, 2019). Ultimately, teachers can continue to develop professionally, refine the quality of their teaching and mitigate the neurological demands and educational outcomes within the educational landscape.

HEUTAGOGY

The COVID-19 pandemic, in many ways, exemplified the deeply rooted nature of the passive learning phenomenon within education systems. It especially highlighted the strong interdependence of learners on their teachers, which can perpetuate the passive learning phenomenon. Heutagogy speaks directly to this problem by advocating for a reevaluation of traditional curriculum design and structure (Qazaqovna, 2024). The AFCEP is, however, not only proposed for learning and skill development benefits brought about via its implementation. It has also been put forth for its potential to activate learners' self-determined behaviours. Despite extensive research on self-determined learning within psychology, its impact on education remains largely unexplored (Glassner & Back, 2019). However, it garners significant attention in research as it focuses on enhancing learner autonomy, capacity, and capability (Qazaqovna, 2024).

Theoretical foundation

Heutagogy, or the theory of Self-Determined Learning (SDL), originally from the word 'heut' or 'self' (Hase & Kenyon, 2007), is foundationally a learner-centred educational theory (Agonács & Matos, 2019) that is rooted in complexity theory, humanism and constructivism. To the authors who coined the theory, heutagogy is primarily concerned with gaining a more detailed understanding of how learners learn best and applying the methods derived from

this understanding to educational systems (Hase, 2014). From a constructivist view, learners gain a better understanding of the world by building on past experiences and knowledge through new learning experiences (Ilieva Nikolovska et al., 2019), whereas from humanist theory, human agency is highlighted. Humanists have also coined ‘learner-centred learning’ (Hase, 2014).

Heutagogy is comprised of four fundamental principles: agency, capability, reflection and metacognition (Blaschke & Hase, 2016). There is also a defining role shift - teachers adopt a more guiding role, thereby lessening their control over the learning process. As a result, learners gain the opportunity to take more responsibility for their learning. From a heutagogic stance, learning and teaching happen non-linearly and are sporadic in nature. Humans are naturally self-determined, and pedagogies that align with self-determination create opportunities for learners to grow their agency (Banerjee, 2019).

Heutagogy, neuroeducation and the flipped classroom

Although still in its early stages, research over the past decade has begun to explore the connections between Heutagogy, Neuroeducation, and the Flipped Classroom. More specifically, Heutagogy draws on the recent developments in neuroscientific research, which provides a neuroscientific basis for a better understanding of how learning occurs (Hase & Blaschke, 2021). Blaschke and Hase (2016) note that neuroeducation research reveals cellular-level processes involved in learning, which can inform evidence-based teaching practices (Agonács & Matos, 2019; Hase, 2016). Hase (2016) continues by stating that neuroscience research can significantly increase our understanding of what is considered the ‘best way to learn’ and shed light on what is often considered ‘good practice’, such as traditional methods of teaching. As every learner’s cognitive structure is unique, this will unequivocally have an impact on how learning experiences are approached, what the focus area of their learning will be, the questions that will be asked to guide thinking and reasoning as well as how the new information will be integrated with prior knowledge structures (Hase & Kenyon, 2013). This is considered to be problematic when teachers mainly use a traditional teaching pedagogy, as learners are taught collectively, which may inhibit quality learning opportunities.

Examining the potential of the flipped classroom to promote heutagogic learning, Green and Schlairet (2017) recognised the potential of flipped classroom pedagogy to achieve this goal. Similarly, Presti (2016) highlights the effectiveness of the flipped classroom to foster heutagogic learning. Presti continues by recognising the connection between active learning and heutagogy, which can be

facilitated via the flipped classroom, a method she considers ‘nontraditional’.

The pedagogy-andragogy-heutagogy continuum

Heutagogy is situated at the opposite end of what is known as the Pedagogy-Andragogy-Heutagogy continuum that originates from the Greek and translates to learner-led, adult-led and self-led, respectively (Luckin et al., 2010). This continuum primarily captures two ideas, (i) the balance between teacher control and learner autonomy, and (ii) impersonal versus personalised learning experiences, which are at opposite ends of the continuum. Pedagogy is considered completely teacher-led, where teachers take sole responsibility for what and when content is taught. Moving to andragogy, a self-directed approach is followed where teachers are seen as ‘mentors’ and learners are encouraged to decide how problems will be solved. Teachers, however, still provide learners with structured learning activities. At the heutagogy end, learners are not only encouraged to take responsibility, they are also provided with opportunities to take initiative and direct the outcomes of their learning experiences (Ilieva Nikolovska et al., 2019). Regarding the passive learning phenomenon, Blaschke (2014) warns that learners are ‘stuck’ at the Pedagogy end of the continuum and that a move towards Heutagogy can be achieved via active learning. According to Hase and Blaschke (2021), learners have to undergo a process of ‘unlearning’ to break free from the familiarity of teacher-led teaching to become more independent and embrace their agency. In their opinion, this can be achieved via the PAH-continuum, which provides a form of scaffolding to activate self-determined behaviours.

The following graphical design (Fig. 1) captures the literature that has been discussed in this sub-section.

SELF-DETERMINATION THEORY

Self-Determination Theory (SDT) differentiates itself from other motivation theories, as it focuses on different types rather than the amount of motivation (Deci, 1992; Deci & Ryan, 2008). SDT has broadly been defined as “...a macrotheory of motivation” (Deci & Ryan, 2008, p. 182) with specific reference to organismic theory, which focuses on behaviour and personality development (Ryan & Deci, 2017). Ryan and Deci continue by highlighting the influence of social-contextual factors as properties that can potentially hinder or enhance an individual’s basic psychological needs. They also mentioned its applicability to the educational domain.

Pretorius (2023) recently advocated employing SDT as a framework to guide the action and implementation of

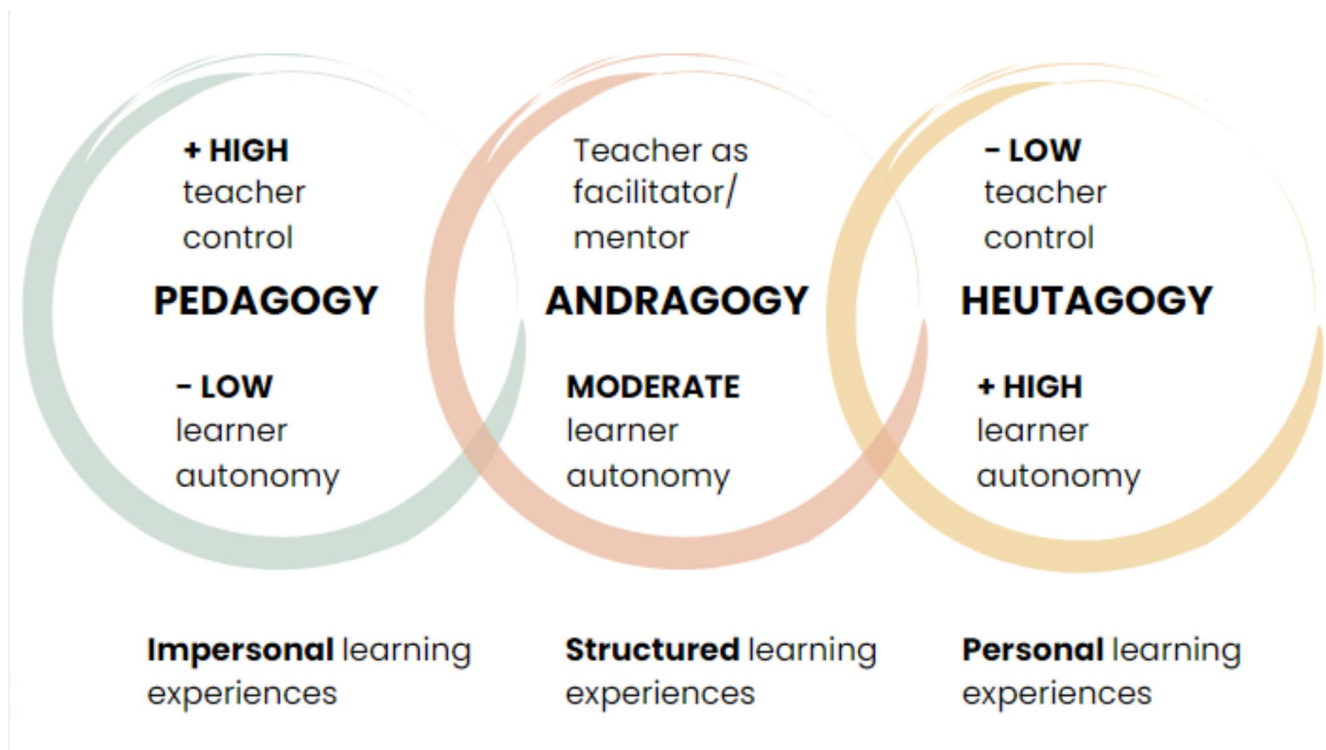


Fig. 1 Visual representation of the PAH-continuum (created by the author)

pedagogic interventions (Ryan & Deci, 2017). The AFCP, as a method of instruction, enhances active learning, which positively affects learner autonomy. This improvement is brought about via heightened motivational properties and increased participation, which positively affect individual learning processes. Therefore, pedagogical interventions grounded within SDT hold the potential to achieve positive outcomes regarding interaction and participation as they focus on the psychological aspects of motivation. This is consistent with Ryan and Deci's (2017, 2022) assertion that a goal of science should be to turn knowledge into practice to enhance human functioning within real-world settings.

Basic psychological needs theory

Ryan (1995) highlighted the significance of one of SDT's six mini-theories, Basic Psychological Needs Theory (BPNT; Deci & Ryan, 2000), to understand how an environment can promote internalisation and maintain intrinsic motivational properties (Howard et al., 2017). Deci and Ryan continue by stating that learners become self-motivated once their basic psychological needs, i.e., competency, autonomy and relatedness, are recognised (Deci & Ryan, 2000). This is significant within educational contexts, as learners' psychological needs are thwarted when subjected to controlling forms of teaching that undermine their motivation (Flamant et al., 2023).

In short, the psychological need for *autonomy* is experienced via volition and willingness, *relatedness* through bonding, warmth and care, and *competence* through effectiveness and mastery (Vansteenkiste et al., 2020). These three needs are regarded as key when it comes to supporting, fostering or thwarting the psychological well-being of humans. It also significantly impacts whether motivation is enhanced or impeded across variables such as age, gender, social class and cultural background (Legault, 2017; Reeve & Lee, 2019; Ryan & Deci, 2019; Vansteenkiste et al., 2010). A recent meta-analysis revealed considerable evidence for satisfying these three psychological needs to facilitate autonomous motivation (Slemp et al., 2024). Elsewhere, Ryan et al. (2022) concur but also highlight the importance of need satisfaction for enhanced functioning. Guay (2022) recognises the importance of learners' need satisfaction to function optimally in school contexts.

Self-determination theory continuum

Earlier SDT research referred to an extrinsic/intrinsic dichotomy (Roth et al., 2007) that was replaced in later years. It now differentiates between different types of motivation along a continuum ranging gradually from controlled to autonomous motivation (Howard et al., 2017, 2020; Ryan & Deci, 2017). The types of motivation along the continuum also reflect motivational quality rather than motivational

intensity (Guay, 2022). More specifically, the continuum moves from *amotivation* which represents the absence of motivation. *External regulation* refers to individuals who act to avoid punishment or obtain some form of social or material reward. At the centre, *introjected regulation* portrays an individual who acts to prevent negative feelings such as guilt or shame or to enhance their self-esteem. Moving towards the autonomous end of the continuum, *identified regulation* refers to individuals who engage in behaviours that offer some form of personal gain and align with their personal values and beliefs. At *integrated regulation*, it is stated that the motivated behaviours of an individual flow from their identity. The behaviour is, therefore, seen as meaningful and becomes an expression of the individual. Finally, at the complete opposite of *amotivation*, is *intrinsic motivation*, a completely autonomous form of motivation. Individuals experience this form of motivation when they engage in activities out of interest and enjoyment (Howard et al., 2017). The degree of self-determined behaviours is clearly displayed via this SDT-continuum. Controlled motivation is associated with less self-determined behaviours, which gradually increases to autonomous types of motivation that are associated with more self-determined behaviours (Howard et al., 2017, 2020).

Self-determination theory and self-determined learning: competing or complementary?

In 2016, Blaschke stated that heutagogy should not be confused with SDT, thereby calling attention to a clear distinction between the two. In 2023, however, a study by Pretorius revealed that SDT and heutagogy can be utilised coincidentally when designing a context-specific active learning intervention. According to Pretorius (2023), SDT should be viewed as ‘determined by the self’, and heutagogy as ‘the self determines’. From a theoretical and foundational point of view, the compatibility of SDT and SDL can be ascribed to the presence of motivational properties. SDT as an umbrella theory is bound by motivation (Deci & Ryan, 2008), whereas self-motivation is critical in SDL as learners are required to exhibit a high degree of intrinsic motivation to learn independently (Blaschke & Hase, 2016; Glassner & Back, 2019; Qazaqovna, 2024).

SDL similarly recognises the need for *competency* to grow the capability of learners, increase their capacity and develop learning-related competencies (Banerjee, 2019; Blaschke, 2012). The need for *autonomy* can be linked to learner agency, a critical component of SDL. Learners are given choices regarding resources, learning preferences and the pace at which they learn (Hase, 2014). Lastly, a parallel between the need for relatedness via learning interactions and in-class collaboration with peers can be drawn.

Learners’ heutogic dispositions develop when they are interacting with classmates. These interactions also provide opportunities for collaborative reflection (Canning & Callan, 2010) and may lead to the discovery of similar or contrasting views, thereby creating extended opportunities for collaboration and reflection (Blaschke & Hase, 2016).

A parallel can also be drawn between the SDT-continuum and the PAH-continuum. The PAH-continuum denotes the balance between teacher control and learner autonomy as experienced within learning interactions. At the Pedagogy (teacher-led) end of the continuum, learners demonstrate lower levels of self-determined behaviours. Teachers offer structured learning experiences as they move toward andragogy; however, due to the role-transitioning that occurs, they become facilitators of the learning experience. As learning becomes more learner-centred and learners are provided with choices, opportunities for more autonomous types of motivation arise, such as identified or integrated regulation. On the heutagogy end of the continuum, learners are encouraged to take ownership of their learning and provided with opportunities to take initiative and direct the outcomes of their learning experiences. Although this requires high levels of intrinsic motivation, it is considered sustainable as learners embark on learning activities or engage with content they find interesting and/or enjoy learning about (Bhoyrub et al., 2010; Ilieva Nikolovska et al., 2019).

The following graphical design (Fig. 2) captures the complementary nature of PAH- and SDL-continua.

A passive learning intervention

Learner-centred pedagogy should receive greater attention to achieve the ‘radical shift’ and ‘systemic change’ within the passive learner landscape. This requires re-evaluating longstanding practices to change how learning and teaching paths are constructed and structured.

There is ample research that connects the concepts discussed to the present. For example, Banerjee (2019) recognises the link between brain research and principles of heutagogy. Vinayan and Harikirishanan (2021) emphasised key role-players’ understanding of SDT to develop a deeper understanding of teaching and learning, whereas Schwartz et al. (2019) highlight the potential of neuroscience to understand the translation of learner experience and motivation to agentic learning. Bruer (2016) recognises the fundamental role of psychology in linking educational research with educational neuroscience. Green and Schlairer (2017) and Hase and Blaschke (2021) both identified the flipped Classroom as a pedagogy that resonates with heutagogic principles. Concerning pedagogy, Barabanova and Kazlauskienė (2020) underscore the importance of new knowledge creation at the

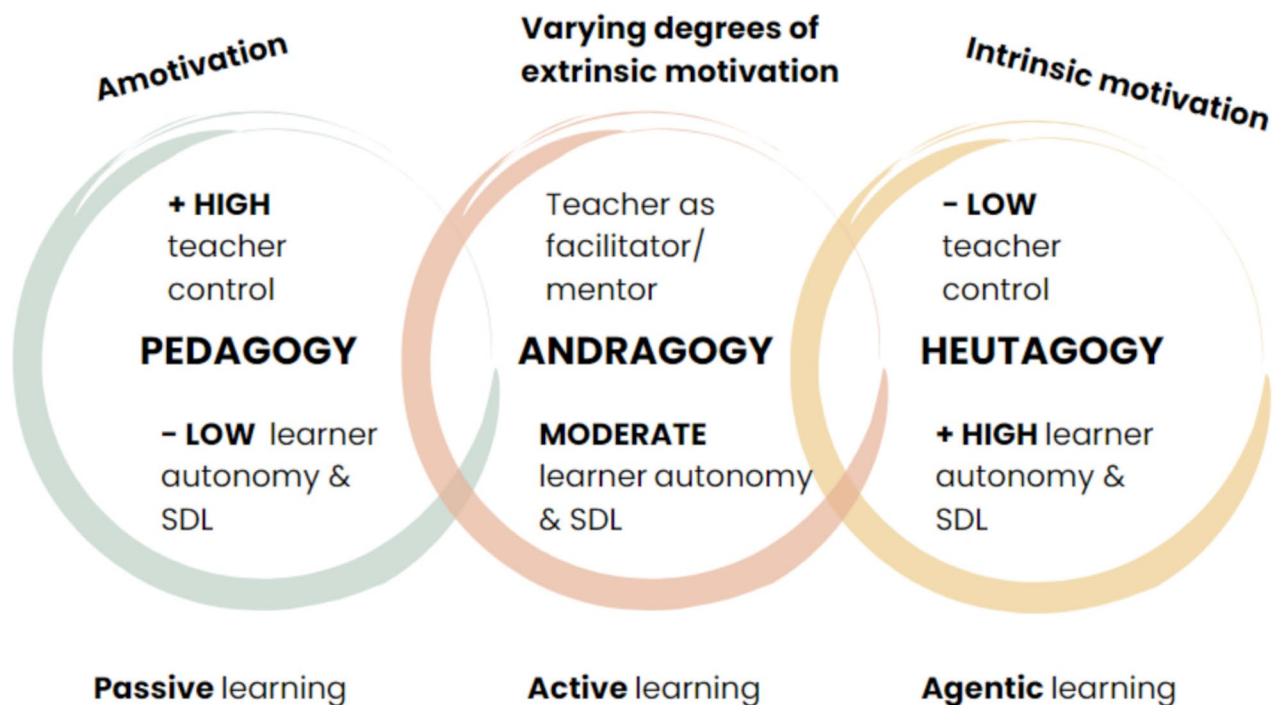


Fig. 2 Visual representation of an integrated PAH- and SDT-continuum (created by the author)

intersection of various disciplines as it potentially holds the most significant impact.

The following conceptual model (Fig. 3) is suggested in light of the literature that has been discussed. While there is evidence that introducing teachers to neuroscience concepts can motivate them to employ more learner-centred pedagogies (Pretorius, 2023; Privitera, 2021; Schwartz et al., 2019), further research is needed to determine the impact of this correlation on the activation of learners' self-determined behaviours that span the PAH and SDT continuums. In short, the model first denotes the importance of exposing teachers (whether pre-service or in-service) to neuroeducational knowledge and neuropedagogy. The framework proposes that such exposure may serve as an impetus to experiment with active learning pedagogy, which may then move learners towards the Heutagogy end of the continuum.

Conclusion

Although a steady shift towards active learning pedagogy is on the horizon, traditional teacher-led practices prevail in most South African classrooms. This is considered problematic as it reinforces the passive learning phenomenon. It is, therefore, imperative to address the call made by Flamant et al. (2023) to develop classroom interventions that focus on promoting learner autonomy whilst decreasing the level of teacher control in learning activities. Consequently, this may

activate learners' self-determined behaviours and initiate a shift towards the Heutagogy end of the PAH-continuum.

Special attention was given to the interrelationship between the flipped classroom, Self-Determination Theory, heutagogy, and the foundations of neuroeducation research. It is argued that the interrelatedness of these four concepts is key to having a better understanding of the importance of learner-centred pedagogies for 21st-century learning. It was suggested that an intervention positioned within this framework, could influence teachers to more readily introduce learner-centred activities in their classes, thereby providing learners with an opportunity to actively engage in the process of knowledge construction and the development of key 21st-century skills. This positively aligns with Sumardi et al. (2020), who have highlighted the importance of aligning 21st-century teaching with the demands of 21st-century learning, Barrenechea et al. (2022), who emphasise the importance of focusing professional development on instructional strategies that can be applied to real-life classrooms as well as Dubinsky et al. (2019), who recommended policies that prioritise active learning practices in the South African context. By implication, the implementation of this intervention may not only combat the systemically embedded passive learning phenomenon, it may also support the capacity building of teachers to promote self-determined learning, which is limited in the South African context, as per Kanwar et al. (2013).

Moving forward, Schwartz et al. (2019) and Privitera (2021) have raised their concern regarding the lack of

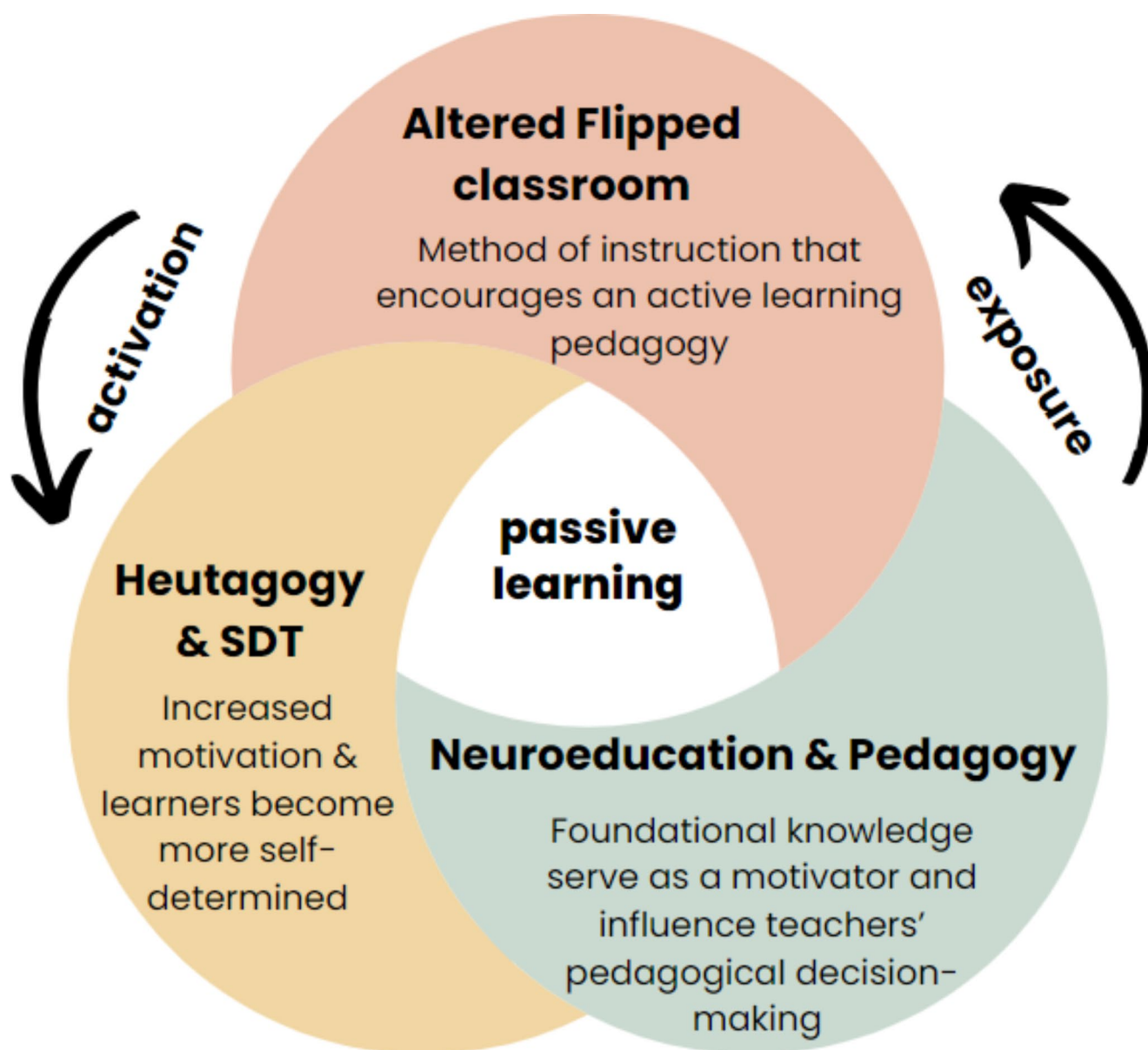


Fig. 3 Conceptual Model of the Passive Learning Intervention (created by the author)

neuroeducation training for teachers. This research can contribute to the current discussion on the importance of increasing teachers' neuroeducation literacy as it has the potential to impact their pedagogical decision-making directly. It may also assist teachers in addressing a concern Barrenechea et al. (2022) put forth, i.e., to design curricular interventions that align their macro curricular decisions with their everyday classroom practice. Levy-Feldman (2018) states that higher levels of teacher SDT require heutagogical methods that are considered 'higher order pedagogical skills'. The SDL teacher-learner dichotomy should be explored in further research, as attention was not given to the SDL of teachers and how this may impact their pedagogical decision-making. Additionally, the suggestion is

made to introduce a module on neuroeducational research in pre-service teacher programs to make them aware of the potential of active learning and learning-centred pedagogy.

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Declarations

Conflict of interest The author has no competing interests to declare that are relevant to the content of this article.

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