Original Paper

The Modification of Boerkaert's (1999) Model of Self-Regulation to Include Younger Learners

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Abstract

This study of self-regulation draws on Boerkaert's (1999) model but proposes adaptations. In particular, it examines the role of the teacher in the promotion of self-regulation, and the importance of curriculum for creating opportunities for autonomous learning. Since Boerkaert's model was devised for older learners, adaptations are proposed to reflect its possible meaning for younger learners, particularly through the supportive scaffolding of their learning and development toward self-regulation. The study uses an international sample survey of children's responses to curricular experiences, as well as making comparisons between different educational systems and environments. The article concludes with suggestions for changes in practice to develop self-regulated learners from the early primary years.

Keywords

self-regulation, younger learners, research informed, teaching strategies

1. Introduction

Self-regulation has grown in importance as a new idea in education. Self-regulation is a self-directed process according to Zimmermann (2002). Pupils who are self-regulated set their own goals, possess superior motivation and utilise adaptive learning methods. Winne (1997) sees young learners as self-regulated when they are able to adapt their approaches to learning. For the purposes of this article young learners are defined as early primary children aged 5-7 years. Paris and Paris (2001) speak of the self-regulated individual who "monitors, directs and regulates" their work towards their own set goals. Self-regulated learning includes knowledge activation, metacognitive monitoring, regulation and reflection according to Azevedo (2009).

"Self-regulated learning is - an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behaviour, guided and constrained by their goals and the contextual features in the environment".

(Pintrich, 2000, p. 453)

This quote locates the goal-directed, self-regulatory process at the pupil level in the environmental context, however the teachers' role in the development of self-regulatory practices is omitted from this definition. The pupil's individual motivation is seen as important as the active process of self-regulation depends upon the learner setting goals for their learning and assessing their progress and achievements. With regard to the part that the environment plays in the development of self-regulated learners, Butler (2002) charts the progress of the concept of self-regulation as moving from the self to the "self in context". Earlier studies looked more at individuals' processes and now research is focusing on the social process, seeing the growth of the autonomous learner as related to both the individual's predilection to self regulation and the learner's environment as pivotal factors.

This article particularly focuses on Boerkaert's (1999) theory of the self-regulatory process. Boerkaerts (1999) sees the construct of self-regulation as inherently complex and related to research into learning needs, metacognition and theories of the self.
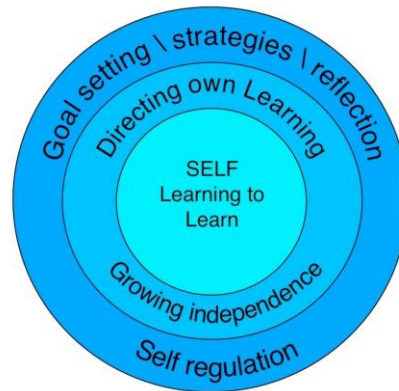
Figure 1. Representation of Boerkaert's (1999) Model of Self-Regulation

As you can see from the figure above, Boekaerts' (1999) model of self-regulation consists of three areas. Unlike some models there is not a sense of development through the layers, more a sense that a truly autonomous learner will have developed all three areas.

Self/Learning to Learn

The centre of the model is concerned with the regulation of processing modes. This relates to the learner understanding how they learn, their learning styles and how they process information. In relation to the pupils, knowing themselves in relation to their learning and which strategies work best for them will aid their autonomous learning ability. For example, children may experience different ways of discovering

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information: asking other people, learning how to ask questions using a search engine or summarising information from texts. The notion of learning how to learn is key in self-regulation. The responsibility for learning shifts to the learner and the role of the teacher is more autonomy-supportive. Learning to learn is essential in the development of a self-regulated, autonomous pupil.

Directing own Learning/Growing Independence

The middle layer is focused on the regulation of the learning process. This is the ability of the individual pupil to direct his or her own learning. This could relate to choices made as to the media in which to present their ideas or the generation of questions to pursue the answers to. The pupils can be given choices as to how to present the information discovered on a particular topic after explicitly being taught how to use PowerPoint, make a poster or create a booklet. This ability will vary for different areas of the curriculum and the age of the child. Vygotsky (1986) believed that metacognition is not realised in children until adolescence. He alleged that children could master the rules for directing their own attention, thought and behaviour but that this mastery does not become fully conscious until the children are able to think about the rules themselves, which means thinking about their own thinking. However, Perry's later research (1998) examined young children's self-regulatory practices when writing. She found that young pupils are indeed capable of managing their own learning. Perry reported that the seven and eight year olds in her study displayed an awareness of their own thinking processes and were able to stay focused on the task in hand.

Goal Setting/Strategies/Reflection-Self Regulation

The outside layer of the model is concerned with the regulation of the self and goal setting. Boekaerts (1999) specifically references personally chosen goals. Self-regulated learners should be able to select and be committed to goals for their learning and this was explored with the pupils in the study for this reason. This practice would need careful scaffolding and instruction as effective goal setting is a skill, which would need to be developed by the pupils. This layer also includes strategies and reflection as truly self-regulated learners will have developed their own strategies for learning independently and will naturally reflect on the process of learning. Again the process of reflection can be explicitly framed and taught to the children. Different forms of reflection can be introduced and practiced.

Self-regulated learning embraces the three areas and links all of the sections of the model.

The Role of the teacher

The limitation of this model is the role of the teacher in the development of self-regulation. The teacher in this context is as a facilitator, to provide feedback and to aid the pupil's reflective processing and analytical skills as well as to scaffold the learning where appropriate. In fact it is the teacher that holds the key to the development of autonomous learning through their pivotal place in facilitating their pupils' motivation. An interesting point is made by Boekaerts (1999) with regard to the relationship between the learning environment and self-regulated learning, that it is in fact a bidirectional relationship. A powerful and challenging learning environment promotes the application of self-regulatory skills. The skills that an autonomous learner acquires allow them to access fully the learning experiences the environment

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provides. The teacher's role includes the provision of the classroom environment and other areas where learning takes place. Boekaerts and Cascaller (2006) explored the social context of learning further by looking at the social origins of student actions. Cues in the environment were stressed as well as the importance of student goal setting. The culture of the school, its leadership, ethos and community has an effect on the teachers, the pupils and their learning experience.

Other work by Boekaerts and Corno (2005) involved a top down and bottom up model of self-regulation. Self-regulated learning is seen as having two distinct sides. One is the teaching of strategies to support the learner and the other is the development of the pupil as the individual becomes more self-regulatory in their learning and constructs their own strategies. Autonomy is the goal in education, the ability to guide one's own learning is shaped by the learning experiences the student receives and as teachers we hope all pupils become autonomous learners eventually. These two views of self-regulated learning are both useful as they are focused on the processes of learning, the development of the individual child as well as the variety of instruction. Regardless of the view one takes, pupils do become more self-regulatory with age, experience, opportunity and motivation. A teacher may have to take a more direct approach initially as the pupil is in the process of developing their autonomous behaviour. A teacher would explicitly teach those skills required by the pupil to develop independent self-regulation, supporting pupils with planning a task or project through scaffolding research, assisting with time management of the task and helping the pupil to become more self-regulated in their learning. As the pupil gains the confidence to work more independently and develops the awareness of their learning process, then the teacher's role changes to be more of a facilitator, supporting the individual's work and encouraging them in their autonomy.

It is the role of the teacher, particularly with relation to younger learners, that is missing from Boerkaert's (1999) model. Prior to learning to learn the pupil needs to be explicitly taught the skills necessary. Practices relating to the development of self-regulatory autonomous learning would be modeled, demonstrated, rehearsed and eventually independently applied. Children may also have natural emergent abilities in relation to self-regulation, which could be repressed by the tasks they are directed to do by a more controlling teacher. Garner (2009) examined the executive functions of the brain in relation to how these processes support the development of self-regulation. For example self-monitoring and impulse control would aid pupils in planning and goal setting. The executive function of motivational drive relates to strategy use and the regulation of effort. An autonomy-supportive teacher would be more likely to encourage child-led learning, which would nurture the child's innate abilities and intrinsic motivation. Barrable & Arvanitis (2019) linked theories of self-determination to autonomy-supportive teaching practices.

2. Method

In the study a pupil questionnaire was created to ascertain the level of self-regulation exhibited by learners at the end of the primary years, i.e., at ten or eleven years old. The results showed that 83.5% of the pupils in the research study demonstrated a high level of self-regulatory behaviour with regard to the answers given. Five of the questions, which reference aspects of self-regulatory behaviour, are examined in more detail in the results section. The generalised results in relation to these five questions had positive responses from 76% to 93%.

Looking at the results of the study, both the quantitative and qualitative results would indicate the need to re-think Boerkaerts' (1999) model to include younger learners' move to develop the required skills and strategies in order to learn to learn to be self-regulative.

The mixed methods research was carried out in twelve schools in eight countries. It involved questionnaires being given to 404 pupils and 20 teachers in the last year of primary school. The head teachers of the schools involved gave their permission for the questionnaire to be given to the pupils in Year 6 age classes in their schools and the study received ethical clearance from Durham University in England. There were five International Baccalaurate (IB) schools and seven other curriculum schools involved in the study. Ten individual pupil interviews were conducted after obtaining permission from their parents.

Table 1. Participating Schools' Curricula

School	Curriculum
Pilot School UK	England National Curriculum
British School Dubai	England National Curriculum
South African School	National Curriculum South Africa
Nigerian School 1 (NS1)	Montessori
Nigerian School 2 (NS2)	Nigerian National curriculum
Nigerian School 3 (NS3)	Nigerian & British National curriculum
Nigerian School 4 (NS4)	Montessori & Edexcel International
International School Dubai	IB Primary Years Programme
International School Germany	IB Primary Years Programme
International School Vietnam	IB Primary Years Programme
International School Singapore	IB Primary Years Programme
International School Denmark	IB Primary Years Programme

The pupil questionnaire created for the purposes of this study was based on the Academic Self-Regulation Questionnaire (SRQ-A) from Rochester University's Self-Determination Theory (SDT) website. The series of studies outlined in the paper by Ryan and Connell (1989) validates the SRQ-A questionnaire, they worked with the assistance of primary school teachers to identify the four areas considered central for academic performance. The pupil questionnaire adapted for use in this study has a Likert-type four-point scale. A four-point scale was used as this has been found by researchers at Rochester to be the optimum number for younger pupils to rate themselves on. As the pupils at the end of the primary years are ten or eleven years of age and are in the younger range of the target audience for this questionnaire the same scale was selected for use. Twelve "I" statements were constructed, which if all were "Very True" would indicate that the pupil had developed a reasonable level of autonomy and that they are becoming self-regulatory in their learning. The "I" statements were formed to be as neutral as possible without using any curriculum specific terminology. The target children's teachers gave the pupil questionnaire to their pupils.

As the stance of the teacher with regard to supporting self-regulation is an important consideration, the Problems in Schools questionnaire (PS) was obtained from the Rochester University website. It was given to the teachers who taught the pupils in the study. The questionnaire aims to identify autonomy-supportive teachers and how they teach and motivate their pupils. Access was requested from Rochester University SDT website and permission was given to access and use the questionnaire for research purposes. Reeve et al. (1999) critically evaluated the Problems in Schools (PS) instrument in their research paper.

3. Result

3.1 Questionnaires

The questions were selected to reflect aspects of self-regulatory behaviour and were expressed in simple terms to aid understanding for the children across the various schools studies. Looking at the questionnaire a sample of the questions, which highlight the area of independent, self-regulated learning are included in the table below with justification of the questions' inclusion.

Table 2. Pupils' Questionnaire

	Question:	Results:
Q7	**I think about my work to help me improve in the future**	**88%**

Here the focus is on self-assessment and the cycle of self-evaluation, goal setting and feeding forward for improvement. This statement links to Q8 as considering your work could lead you to goal setting for further tasks. Black and Wiliam (2001, p. 7) stated that, "pupils should be trained in self-assessment so that they can understand the main purposes of their learning and thereby grasp what they need to do to achieve".

Q8	**I set myself learning goals**	**76%**

The setting of goals is an important part of regulating one's own learning. Explicit teaching of this skill through the creation of SMART goals for example aids the process. Practicing goal setting and reflecting on the completion of these goals are important self-regulatory skills. Daniels and Bizar (2005) cited the implementation of goal setting as an important tool in aiding pupils with planning, monitoring, and evaluating their own learning.

Q10	**I feel I am able to work on my own**	**92%**

We are aiming to develop independent learners who can sustain their intrinsic motivation and work alone when required. This is not to say that group work and collaboration are not important skills as well. The teacher's role is vital as their passion for the subject being taught can motivate the pupils to pursue more independent investigations on their own (Malone & Smith, 1996).

Q11	**I have learnt new skills and strategies to help me learn**	**93%**

Part of the autonomy-supportive teacher's role is to provide a range of strategies, which the pupils can try out and adapt to their needs. These could be note-taking strategies or forming efficient research questions for example. The Sutton Trust's report: What Makes Great Teaching (2014) highlighted quality instruction as an important component of effective learning. Having a number of strategies or skills explicitly taught and modeled as well as scaffolded, with time to practice, are components of quality teaching approaches, which aid the pupils' progress and self-regulation.

Q12	**I am excited about learning**	**90%**

Motivation toward learning is a key component of self-regulation particularly with relation to resilience and coping with setbacks or experiencing difficulties. We can teach pupils how to fail better, develop their motivation and help them to understand that learning happens through failure, effort and hard work. Dweck's (2006) growth mindset is utilised in a number of schools to support this process.

The highest percentage of pupils from the questionnaire believed they had learnt new skills and strategies to support their self-regulated learning. The second highest result demonstrated that pupils felt that they were able to work independently. It is also heartening to see that across the schools and the different countries, 90% of the children surveyed at the end of their primary school were excited about learning. The percentage of children thinking about their work towards improvement in the future was quite high. The role their teacher may have played here was not explored in the questionnaire, however autonomy-supportive teachers would build in regular reflection for their pupils to help the children set goals for their own learning. Setting goals was the lowest of the five results here. There are a number of variables, which may affect these results. We do not know if the teachers in the various schools generally set learning goals or specifically taught supporting strategies.

Teacher effect is one factor to consider with regard to comparing pupils' development of self-regulatory learning. However there are many variables in the schools that impact the results. For example, in the pupil questionnaire there was one question that was concerned with the setting of learning goals, an important part of self-regulatory practice. In the results there were some large percentages in "Not At All True" responses from Non-IB schools. Sitzmann and Ely (2011) found that student achievement was related to setting goals as well as persistence, concentration and confidence. These aspects all are important for individual motivation. Goal setting is referenced in the outside layer of Boerkaert's model (1999).

For this study the schools' websites were examined as well as using information from colleagues through contact with the individual schools. Curriculum background, mission statements and information regarding aspects of self-regulated learning were collected. The relationship between teachers' approach to pupil autonomy and the pupils' autonomy is a key issue along with the classroom environment.

In the teachers' results the PS questionnaire continuum ranges from highly controlling teachers through moderately controlling and moderately autonomy supportive to highly autonomy-supportive. The teachers' results from the questionnaire could be related to the pupil questionnaire results. The highly autonomy-supportive teachers with single classes were in three schools: an international school in Denmark, one of the Nigerian schools and the pilot UK School. In Denmark 90% of the pupils scored in the top quartile. In the Nigerian school all of the pupils were in the top quartile. In the pilot school there were 87% of the pupils who scored 37+ points. Highly self-regulating pupils were matched here by highly autonomy supportive teachers.

The Nigerian schools are interesting in that in NS2 and NS3, both teachers scored very low on the teacher questionnaire (0 and 2 points) and are therefore highly controlling teachers by the questionnaire results. However their students scored highly on the student questionnaire, NS3 had 84% of their students score in the top quartile and NS2 had 100% of the students score as highly self-regulated. It would have been interesting to see the questionnaire being presented to these students and whether extra information as to the completion of the questionnaires were given on top of the instruction sheet provided. In a school

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where there is a high incidence of tests and exams, would a questionnaire like the student questionnaire be an unusual occurrence and therefore maybe treated more like another test to try to attain the highest mark? Do the students think that there are right answers to the questions on the student questionnaire, maybe seeing the Very True answer as the required answer? De Leeuw (2011) explored the surveying of children and cites the notion of desirability in the way that pupils may answer questionnaires.

> "In early middle childhood (7 to 10) children have a tendency to please and are afraid of doing something wrong. This may result in more superficial answers and in an inclination towards social desirability".

(De Leeuw, 2011, p. 8)

One of the teachers surveyed (International School in Vietnam) contacted me with regard to feeling that her pupils might have selected the answer they believed that she would want them to choose. As part of my reflection on the research process I do acknowledge that having the pupils' teachers administer the questionnaires may have affected some results.

The teacher questionnaire focused on the teacher's stance in relation to the continuum of teacher stance from controlling to autonomy supportive. Flink, Boggiano and Barratt (1990) examined controlling teachers and described how, in a class with a controlling teacher, the intrinsic motivation and the level of performance of the pupils both decreased. The motivation of the pupils is linked to their teacher's approach and support of self-regulated learning. McCombs and Marzano (2010) talked of the pupils' "will" to learn, their motivation to become independent learners. Again the teacher's role in inspiring, engaging and motivating the pupils' own desire to learn is central. Zimmermann's model of self-regulated learning ability (Schunk & Zimmermann, 1997) was socially based and environmentally linked with the teacher playing a key part in this process. At the lower levels of Zimmermann's model, feedback from the teacher was seen as important as supporting pupil autonomy. The role of the teacher and the pupil/teacher relationship is essential to the pupil's development of self-regulatory learning. A number of studies stressed this vital factor. Deci (1991), Larkin (2009), Hattie (2011) and De Jäger, Jansen and Reezigt (2002) all emphasized the importance of the autonomy-supportive teacher and how the teacher enhances the intrinsic motivation of the pupils. Engle and Conant (2002) talked of pupils being the "authors and producers of knowledge", the ownership of learning belonging to the pupils. Again the teacher's approach to the pupils' autonomy is critical here. A controlling teacher would not allow the pupils to be "authors and producers" and would take more ownership of their pupils' learning processes and products. Therefore, autonomy-supportive teachers are a very important part of the development of self-regulated learning in their pupils.

The Christian centred Nigerian School (NS3) stated that they encouraged independent learning but there are also regular national tests. The teacher of this class was the highest controlling teacher with a score of zero on the teacher questionnaire. Is more control required, when there are national requirements for tests?

The teacher at NS3 scored on the PIS as a Highly Controlling teacher. The school follows the Nigerian national assessments and there is regular testing. When with regard to developing independence, it was stated on the school's website that, "The pupils have been trained to work independently but are to signify when they need help". This does not indicate the teacher's role in supporting the students as it sounds as though the responsibility for learning on their own is the students'. Working independently and having developed self-regulatory practices and strategies are not necessarily the same. As already stated more information and first-hand experience of the school would be beneficial here. The school environment was described as one that encouraged, "participation, curiosity and inquiry". It would be interesting to find out more about how the curriculum was delivered by the teachers.

One of the Nigerian schools mentions "interactive lessons" where, "Pupils are **made** to participate". This is an interesting statement, as interactive lessons would appear to indicate more engagement and participation o the part of the pupils. The notion of forcing participation however is very counter to self-regulation and autonomous learning. The "power of praise", is stated as being used in the school, which would suggest that the pupils are positively encouraged in their learning. However, the teacher for this class scored as highly controlling on the teacher questionnaire.

As part of the student questionnaire one sentence starter ("Learning is….) was included and the responses were analysed to discover if the learning experiences the pupils experienced were supportive of self-regulatory learning.

A pupil from one of the UK curriculum schools commented on the method of learning: "Learning is a bit fun but it needs to be more hands on sort of stuff instead of text book stuff". In comparison to the IB programme, which incorporates a range of assessments, one pupil from the South African school completed the first sentence starter with an answer that indicated how test driven the curriculum is in their school. "Learning is … something you learn to take a test".

One of the IB pupils wrote, "Learning is… joy and a great opportunity in my perspective. Learning new skills and strategies is a very important part of learning and I feel I do it". A pupil from the international English National Curriculum school stated that, "Learning is … sometimes fun but mainly copying from the board".

The highly-supportive teachers' pupils also referenced their teachers' pedagogy and demonstrated their motivation for learning. "Learning is … like not really exciting and not hard but learning should be fun that is how we learn better". and "Learning is … discovering new methods and ways to do something". (both from the international English National curriculum school)

"Learning is … very interesting for me depending on the way my teacher teaches me because sometimes I don't pay attention to him". (Nigerian School 1)

This statement highlights the importance of the teacher's stance in regard to their teaching and how successfully they engage their pupils in their learning.

3.2 Interviews

I undertook a series of interviews with a number of pupils from the international school I was based in at the time of the study. It was easier in person to correlate the teacher's stance to the results from their pupils' questionnaires as I had observed the class. The pupils were asked to read four statements regarding how they learned best. They commented on each one and discussed aspects of learning and teaching. The pupil then suggested a statement about learning that they believed was how they learned best. The interviews were recorded and transcripts written. The responses of the pupils interviewed were initially sorted by the categories of the individual statements as they related to the pupils' learning. These quotes were then analysed for content. Statements relating to the way pupils learn, their ideas relating to independent learning and teacher stance were the principal categories identified. The focus for these interviews was to see how pupil motivation related to the ways pupils learn and the role of the teacher.

The students expressed their interest in working on their own and finding out about a topic for themselves or discovering more about themselves. This relates to the centre of Boerkaert's model (1999) when the student is learning about themselves and how to learn. One of the pupils interview expressed their feeling that, "It's just like you're unlocking something in yourself, and without people telling you what to do or friends giving ideas and then you have to do that idea. You're unlocking something you're unlocking yourself and learn more about yourself".

The students demonstrated their appreciation of the hands-on, experiential approach, as a more effective learning experience. By learning for themselves they are developing the self-regulatory skills. One of the pupils stated,

"When we get to actually do things we learn better because we were trying it out instead of just listening to the person trying it out".

An independent, self-regulated learner who reflects on his or her learning will also learn from mistakes. In an inquiry based programme teachers support the pupils in their inquiries by allowing them to struggle at times, to make mistakes and to learn from these and to set themselves goals based on their work. All of the pupils interviewed agreed that hands-on practical lessons helped them to understand more. Individuals referenced science, music and mathematics as subject areas where this type of learning deepened their understanding. The pupils discussed group work and how they felt that they learnt from each other in collaborative tasks. As one of the international pupils interviewed said,

"You can share knowledge through yours and other people's mistakes. So if you make a mistake you know what you need to improve next time. You can learn from other people's information, you are sharing the knowledge".

The IB's Primary Years Programme includes the elements required to support self-regulated, autonomous learners. However the quantitative data from the pupil questionnaire showed that pupils from other curriculum schools also have developed self-regulatory practices.

4. My revision of Boerkaert's Model

In Boerkaert's (1999) original model the role of the teacher in the development of self-regulation is not outlined. In the revised model within the new Emergent Self-Regulation Learning centre is where the skills, strategies and practices essential to the development of independent, autonomous learners are initiated and encouraged by the teacher. This adapted model could be seen from the centre to the outside as growing independence for the pupil and diminishing support from the teacher as self-regulation develops, this is developmental and not age-related.
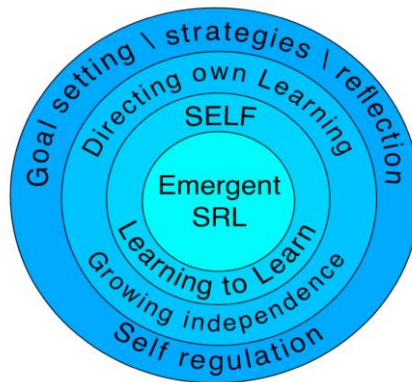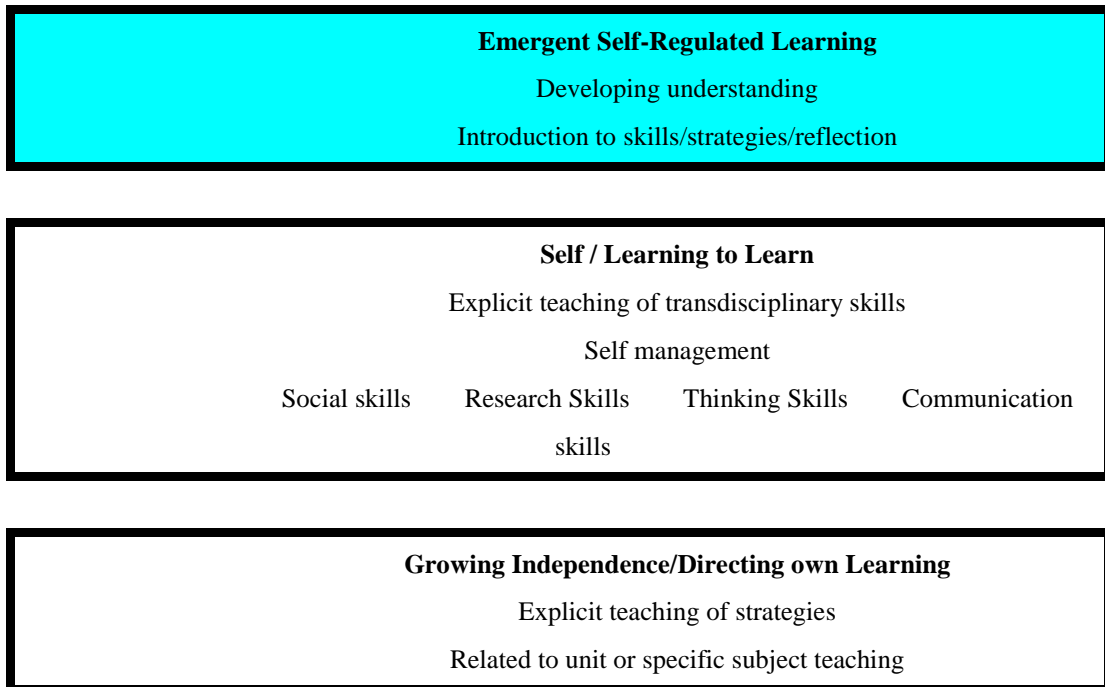

Figure 2. Adapted Boerkaert's Model for Younger Learners

Details of the Adapted Boerkaert's Model for younger learners

Emergent Self-Regulated Learning
Developing understanding
Introduction to skills/strategies/reflection

Self / Learning to Learn
Explicit teaching of transdisciplinary skills
Self management
Social skills   Research Skills   Thinking Skills   Communication skills

Growing Independence/Directing own Learning
Explicit teaching of strategies
Related to unit or specific subject teaching

Goal setting/ Strategies/Reflection-Self-regulation

Explicitly encouraging and developing reflective practices

Use of reflection tools

Independent goal setting

Portfolios including self-assessment

Emergent Self-Regulated Learning

The focus in this area of the model would be on understanding of the required skills and strategies for all areas of the curriculum. The practice of reflection would be introduced slowly with a lot of scaffolding with examples and pictorial representations for the youngest learners. Technology could be utilised effectively here recording via audio or video the children's reflections on their learning.

This emergent layer would be characterised by explicit teaching of transdisciplinary skills such as self-management, social and communication skills initially then developing thinking and research skills to support pupils' learning development. With regard to strategies, these should be explicitly taught through subject areas, as there are specific strategies for mathematics, writing, science processes, etc.

The encouragement and development of reflective practices would be scaffolded though teacher modeling and positive praise. Various tools would be introduced and utilised in aiding the pupils to set small achievable goals for their individualized learning. Portfolios either in file form or online would be collated to chart the child's learning journey.

Hattie (2012) examined teaching and the effect of teachers. In "Visible Learning" he refers to self-regulated feedback for the pupils,

> "This level of feedback describes how learners can monitor, direct, and regulate their own actions as they work toward the learning goal. Feedback at this level fosters the willingness and capability to seek and effectively deal with feedback, to self-assess and self-correct, to attribute success to effort more than to ability, and to develop effective help-seeking skills". (Hattie, 2012, p. 20)

Here the focus is on the feedback given by the teacher to aid the pupil with the development of self-regulative skills. This could involve asking the pupil as to the strategy used for information retrieval or to prompt the pupil into considering other strategies to try if they were having difficulty with problem solving for example. As a teacher we need to encourage the pupils to develop effective skills across the curriculum.

The importance of the teacher's role has come to be a central issue in this study. The teacher and pupil relationship with regard to teaching and learning is a vital area for the pupils' development of self-regulatory practices. Having pupils take more responsibility for their learning and for them to teach others is a powerful concept. This research study was focused on the influence of the curriculum but the teacher is the pivotal player in the delivery of the curriculum. The teacher's stance with regard to

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supporting autonomy is also crucial.

The English National Curriculum information does include some reference to "independent learning". The major curriculum documentation focuses more on the knowledge required at the various key stages and is still test based. The Effective Lifelong Learning Inventory (ELLI) a project, from Bristol University identified seven characteristics of effective lifelong learners and has been explored by a number of educational practitioners in the UK. These seven characteristics are changing and learning, critical curiosity, meaning making, creativity, resilience, strategic awareness and learning relationships. All of these attributes contribute to the development of an independent learner. Linking to Boerkaert's model (1999) changing and learning relates to the Self and Learning to Learn original centre where pupils start to develop a sense of themselves as learners. Critical curiosity can be matched with Directing one's own Learning. Pupils' interest in topics introduced can lead to them having the self-motivation to want to find out more. The notion of criticality can be encouraged and developed by questioning and articulation of thoughts and ideas. From the pupil's research they can make meaning of what they have personally discovered. Creativity can be developed by the learning environment and encouragement from the teacher for the pupil to move out of their comfort zone and try new activities and pursuits they may not have previously considered. The notion of resilience relates to the Growing Independence of the pupil as their self-regulative abilities increase they are ready to persevere in their own development as a learner. Strategic awareness likewise demonstrates the pupil's independence as they are aware of their thoughts, feeling and actions as a learner and can utilise this awareness to manage their own learning process. The learning relationships characteristic relates more to the confidence and ability to work with others on cooperative tasks and also to be able to work independently when required.

Prior to Boerkaert's centre of the model, which was concerned with the self and metacognition when pupils learn how to learn, I would suggest that younger primary age pupils in many schools can be introduced to aspects of self-regulation and autonomous learning. My revised Boerkaert's model with its new "Emergent Self-Regulated Learning" centre relates to the role of the teacher in introducing, modeling and teaching the skills and strategies needed by the pupil in order to develop as autonomous, self-regulated learners. Grow (1991) charted the stages the teacher moves through from the centre of the revised Boerkaert's model (Figure 2) to the outside layer as from authority coach through motivator and guide to consultant and delegator. The teacher explicitly teaches the skills and strategies required for the pupil to become more self-regulated acting like a coach. Then as the pupil becomes more independent the teacher guides and motivates the pupil in their adoption and practice of these skills and strategies until the teacher withdraws further as they become more of the "guide on the side" as a consultant for the pupil when required as well as delegating more of the organisational tasks to the pupils themselves. The skill of the teacher lies in developing the pupils' readiness for learning and openness to the learning opportunities. The teacher also needs to be able to gauge the individual learner's development, knowing when to encourage and when to let the pupil lead. This relates to the

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teacher training and continuous professional development, which is required to support the teacher. The pupils' own self-awareness as to their effectiveness as learners, their creativity and their abilities to use problem solving are all scaffolded and encouraged by the autonomy supportive teacher.

Darby (2005) also highlighted the pivotal influence of the teacher with regard to pupil engagement. The autonomy-supportive teacher models self-regulatory practices for their pupils. They can also demonstrate how failures and mistakes can lead to learning. The teacher's passion and excitement for their subject can be infectious, increasing motivation to learn for their pupils. If the pupils are excited to learn they will try out new strategies and experiment with their ideas more independently when they have the optimal environment created by their teacher.

There has been some research into younger learners' self-regulatory development, which outlines suggestions for supportive strategies and approaches. Joyce and Hipkins (2004) investigated children's emergent self-regulatory learning skills in science lessons. They found that with the appropriate support Year 1, 2 and 3 children (aged 5-8) demonstrated foundational aspects of self-regulated learning. The teachers planned a series of learning opportunities for the pupils, which started with free exploration, then modeling, structured investigation and independent investigation. The classroom environment reflected the optimum conditions for peer interactions by being socially supportive and intellectually challenging (Fredricks et al., 2004). The developmental plan included plenty of time for discussion before and/or after the practical activities. The teachers outlined and discussed the learning objectives and success criteria making the objectives clear to the pupils. They modeled their thinking out loud as they demonstrated practical tasks and developed teacher questions and visual prompts to scaffold the children's learning. With relation to recording, the teachers discovered that writing reflections took too long for the children and they utilised alternative recording formats using video/audio recording and children's drawings to explain ideas.

Pino-Pasternak et al. (2014) examined the interventions and classroom contexts, which promote self-regulated learning. The activities highlighted as supportive included collaborative learning, meaningful tasks which were authentic for the children, the encouragement of group decision-making and play. Play was seen as the opportunity for children to rehearse strategies (Whitbread, 2010, 2011). Explicit instruction in strategy selection as well as goal setting is seen as vital, along with dialogic questioning and teaching the skills required for collaborative work. These collaborative skills include listening, helping and conflict management. Scaffolding tasks and involving the pupils in self-assessment of their progress are also important aspects for self-regulation. A classroom ethos where mistakes are viewed as learning opportunities and children are encouraged to have positive feelings toward tackling challenging tasks is paramount as are the clear communication of expectations. These expectations should be co-constructed with the children to ensure their commitment and engagement.

The Education Endowment Foundation (EEF) made recommendations in 2018 regarding metacognitive strategies, which are taught with subject specific content. These involve the pupils planning, monitoring and evaluating their learning. Prior knowledge activation initiates a new topic where the pupils share their understanding and pose questions to explore. Structured reflections and modelling strategies were included as well as making sure there was an appropriate level of challenge for all pupils. Class dialogue and discussions are seen as building knowledge and understanding. Pupils should be explicitly instructed as to how to organise and manage their learning.

The seventh, and I would suggest the most important recommendation, highlighted the importance of professional development for teachers. This change in approach to teaching involves teachers in adopting or adapting pedagogy and examining their teaching philosophy.

Meyer (2010, p. 1) emphasised the importance of the role teachers play in developing self-regulated, independent learners.

> "Pupils do not become effective independent learners by themselves. There is a well-documented repertoire of strategies teachers can use. This has significant implications for the training and development of teachers both in understanding their role and in deploying appropriate strategies for independent learning".

Within teacher training the students need to be taught explicitly with regard to self-regulation with relation to the pupils they will eventually teach. Existing teachers' Continuing Professional Development (CPD) could also include sessions on self-regulatory practice.

5. Conclusion

In this article Boerkaert's (1999) model of self-regulation has been adapted to include younger learners and to acknowledge the pivotal influence of the teacher on a pupil's development of self-regulation. This adaptation of the model has developed from a research study, which originally focused on the curriculum as the main driver for the growth of self-regulatory practice in primary school. The results and analysis of the survey shifted the emphasis away from the curriculum to the teacher.

In order for a pupil to develop as an autonomous, self-regulated learner they require the supportive scaffolding of their teacher as they increase in their understanding of how they learn and become aware of the skills and the strategies they can use in their learning. The development of a supportive learning environment is teacher directed but the teacher is not controlling, they are autonomy-supportive. This support involves explicit teaching and modelling of skills and strategies for the pupils to practice, developing goal setting and reflective practice in the classroom. Teachers include prompts and cues in the classroom such as "working walls" to enable pupils to independently access the information to answer questions, check work or self assess their work through shared checklists for example. The inclusion of self-regulated learning in teacher training and teachers' CPD is an important component in education.

The adapted model's inclusion of an Emergent Self-Regulated Learning centre sees the model as developing outwards towards pupils' independent self-regulation. The adapted model also highlights the role of the teacher in explicitly teaching the skills and strategies required for self-regulated learning. This article has also considered the importance of the learning environment but it is the effect of the teacher, who ignites the pupils' development as self-regulated, independent learners and it is the pupil/teacher interaction that is vital and the teacher who is the key.

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