Theory of constructivism

ASSIGN BUSTER

EMS301Science & Technology in the Primary SchoolKylie Scott ??“ 11378984EssayAssignment 1 Component 2Value: 50%Kelly MungeDue Date: 11th September 2009Word count: 1500 wordsWord count: 1606 wordsThe basis of this literature review is to examine the theory of constructivism with direct reference to the teaching of science. In order to do this the literature was reviewed with a direct focus encompassing the following elements: to establish the theoretical underpinnings of the theory; to engage with the research regarding its effectiveness as a learning approach; the influence of this theory and its implications for the teaching of science; and consequently my view of how I wish children to learn science in my classroom incorporating a constructivist approach. The theoretical underpinnings of constructivism draw on the work of theorists such as Piaget, Bruner and Vygotsky. These theorists provided the basis for the teaching philosophy of constructivism which is widely accepted and advocated by current researchers and educators. It ??? also underpins major recommendations for teaching curriculum documents from around the world (Australian Education Council [AEC], 1991). In examining the constructivist approach it is important to understand the origins of this particular learning theory. It is derived from the broader learning theory of ??? constructivism??™. The theoretical underpinnings of constructivism can be attributed to the research of Jean Piaget who emphasised ??? the active role of learners in the construction of their own knowledge??? (Bobis, 2004).

As stated in EMS301 forum entry by Amy Amos ??? Teachers must become the creators of curriculum rather than the dispensers of curriculum developed by others??? (Smith, G., 2002, p. 586).

This determined the role of the student to be integral in the attainment and growth of their learning and the teacher as being facilitator of learning rather than a transmitter of knowledge (Reys, Lindquist, Lambdin, Smith and Suydam, 2004). The literature reviewed offered varied definitions of constructivism; however there was a commonality that allowed the following characteristics to be determined: Knowledge is not passively received, it is actively constructed by the learnerStudents construct new knowledge through reflection upon their actions Students create a deeper understanding when integrating new knowledge with existing knowledge Knowledge is constructed by each and every learner, therefore students will learn differently from the same learning experienceLearning is a social process in which language through engagement in dialogue and discussion deepens and assists learning(Bobis, et al, 2004; Vygotsky, as cited in Bobis et al, 2004). It is this final characteristic that has led heavily to the development of the social constructivist approach based on the origins of constructivism. This development extended the research of Vygotsky (1978 as cited in Santrock, 2004) which emphasised the social context in which students learn and that ??? students??™ construct knowledge through social interaction with others??? (Santrock, 2004, p. 253).

The major tenet of a social constructivist approach is the importance of social interaction between learners and teachers and learners. This lends itself to emphasise the importance of language and interaction in this approach to teaching mathematics. The most prevalent concept in the literature reviewed was the importance of language in a social constructivist approach. This was explained simply by Telese (1999) in that advocates of

the social constructivist approach ??? view language as being very important because knowledge grows through language and its shared meanings??? (Telese, 1999, p. 5). This is further iterated by Ernest (1993) when discussing that a social constructivist approach believes science is a social construction and that ??? the basis of scientific knowledge is linguistic knowledge??? (Ernest, 1993) and for students to understand and construct knowledge they must verbalise and describe the processes they undertake. The importance of language in a constructivist approach to science incorporates the processes of investigation, design and making and the use of technology.

Research conducted by Skamp (2008) investigated the use of these processes in a classroom situation, it found that students were able to understand concepts in greater detail when given problems that necessitated the students to; explain and justify their thinking and answers given, the thinking and explanations of others and through discussion with the teacher. As stated in EMS301 forum entry by Erin Bromage ??? Students actively construct their knowledge through classroom settings which provide students with learning in a real world setting???. Over the period of the study it was found it became routine for the students ??? to explain their thinking, to ask questions and raise challenges, and to elaborate their explanations and justifications without prompting from the instructor??? (Yakel, 2000); and the learning experience derived the greatest benefits for the students.

Social constructivism theorists contend that social activity is an essential component in a child??™s learning. Santrock (2004) discusses the teaching theory of Vygotsky that says students need many opportunities to learn with the teacher, and more and less skilled peers. Watson (1999, as cited in

Watson, 2001, p. 143) describes the benefits of social constructivism in that when working together students are able to ??? enrich each other??™s learning???, stimulate others views through interaction??? and ??? create knowledge from experience???; benefits which are not derived when working individually. As stated in EMS301 forum entry by Keira Mills ??? Effective teachers design situations that allow students to learn by doing???.

Further evidence is demonstrated in The Teaching Principle which encourages social interaction and students being actively involved in their learning. The principle recommends that teachers provide opportunities that encourage students to think, question and solve problems; discuss their ideas, strategies, and solutions; collaborate with others; justify their thinking; and experiment with various approaches to solving problems. A common thread between the constructivist and collaborative approach, linked to the tenets of constructivism and in the teaching of science is the importance of the reflective process. Within the constructivist approach this is discussed in terms of the importance of language. The research of Driver (1988) found that students were able to understand concepts in greater detail when given problems that necessitated students to; clarify, broaden the range of application of a conception and unpack a perceptual problem. Hassard (1993 as cited in Cross, 2000) supports this stance in his discussion of collaborative groups.

He found that collaborative group experiences further allow students to verbally express their understandings of what they have learnt. The literature also found that it is imperative for students using concrete materials to reflect on their actions as this allows them to ??? construct

meaningful relationships??™ in their learning. Specifically looking at the New South Wales Board of Studies, Science and Technology K-6 syllabus (2002) evidence of the constructivist approach is evident across all strands. The strand consists of three interrelated processes that are to be applied when students are developing new skills and concepts and when applying existing knowledge to solve problems. The processes are Investigating, Designing and Making and Using Technology. Which when examined can be seen as having direct links to the constructivist approach. The importance of these processes in learning is evident in that the Board of Studies recommends that these processes be applied when teaching each of the three strands to enhance student learning.

The examination of the constructivist approach has further reiterated several aspects of the teaching of science and technology that I will aim to employ in my classroom. These include; Identifying my students as being individuals with different ability levels and interest and offering learning experiences that cater to and understand these differencesFacilitating and emphasising communication with myself and students and between studentsPlan scientific tasks that encourage students to develop curiosity, identify needs and learn to use a wide variety of equipment. Plan challenging and diverse scientific tasks including real world experiencesIncorporate the use of play and social interaction in the classroomModel the use of scientific language and encourage students to engage in this use of metalanguage appropriatelyActively involving students in their learningFostering an environment in which students are comfortable in attempting problems and making errors whilst constructing knowledgeI agree with the emphasis on

language and social interaction as described by the social constructivist approach and believe that it not only the subject of Science and Technology that students will benefit if aspects of this approach are employed. Whilst drawing heavily on the tenets of the constructivist approach it is important to recognise that this may not be possible on all occasions. It is recognised through research the power of a constructivist approach to science but also understands that teachers cannot continuously work in such situations. The leads to the acceptance of their learning theories, although the literature overwhelming endorses that individuals are actively involved in the construction of their own knowledge and this point I am in agreement with, it is important not to discredit other theories. As stated in EMS301 forum entry by Erin Bromage , this philosophy to learning has widely been critiqued by the scientific community as being a practice which is being used as teachers are overwhelmed by challenges such as pupils lack of interest in science, teachers inadequate knowledge of science, and schools lack of resources (Matthews, 1997, p.

10). The research of Ernest (1998) into the constructivist approach also clarifies how to use the approach in teaching science and technology; he describes students as scientists working within established scientific theory even attempting to create new links. Although they are constructing knowledge they are sometimes simply applying existing methods. By adopting this stance I recognise students can construct and be actively involved in their learning, but they do not need to reinvent the wheel and can draw on the working of others in learning. In addressing the aspects discussed in relation to the constructivist approach, I believe I will provide

students with an opportunity to be actively involved in their learning and gain a greater depth of understanding of science and technology.

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gov/ERICDocs/data/ericdocs2/content_storage_01/0000000b/80/27/97/6d. pdfFive Forum contributions1. Amy AmosScience and Technology: a subject that makes me quiver, just the sound of it freaks me out. Until today that is. After years of being taught science the ??? boring??™ non practical way through school, I had begun to rather hate it and not see the connections it has to real everyday life. So I began to ponder on its importance in the Primary school curriculum, scary I know.

However after only one 3 hour tutorial my views are being re-considered. In our tutorial we were taught science through hands on, engaging experimental teaching which tapped into my ??? scientific??™ side, which I didn??™t believe existed. You wouldn??™t think such a simple approach of ??? hands on??™ would change the way I learned, but after reading an article this week I understand.

The article was taken from my readings book from rural studies, written by Gregory Smith and titled, Place Based Education: Learning to be where we are. This article struck a chord with me, it aims ??? to ground learning in local phenomena and students??™ lived experience??? (Smith, G., 2002, p. 586).

Although we were not directly relating the experiments to our everyday lives, we were using everyday materials which produced appealing results that can be applied to how things work. Don??™t we want our students and own children to be able to have an understanding of how the world works Aren??™t we much better off teaching real life experiments than concepts only perhaps 1% of our class will end up using If these 4 experiments conducted in a University tutorial excite a room full of mature age people, I can only imagine how they will make our students react. After only one tut, I now have a new aim: To use place based education and relevant Science activities to excite students and trigger their higher order thinking.

It is devastating to think that I remember Primary school science as boring and un-applicable, I would be devastated if any student taught in my classroom one day said the same as I did. ??? Teachers must become the

creators of curriculum rather than the dispensers of curriculum developed by others??? (Smith, G., 2002, p. 586). So as educators, let??™s spruce up the way we deliver the science and Technology curriculum to our students. 2. Erin BromageTeaching Primary Science Constructively.

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.... I am a strong believer of a social constructivist approach to teaching. I believe that all my memories and knowledge of science were constructed through hands-on, real world experiences and social scaffolding. Thus, I believe that students learn and develop concepts through an environment that provides this method of teaching.

Santrock (2007, p. 230) (yes the good old child development text book) highlights that students actively construct their knowledge through classroom settings which provide students with learning in a real word setting. Further, Santrock (2007, p. 229) states that knowledge should be handed down via a skilled individual. In-turn, the teacher needs to become a facilitator who knows the content knowledge they are teaching, and provides opportunities for the students to actively construct conceptual understanding through purposeful and interesting teaching and learning experiences, which relate to their life experiences and pre existing knowledge! 3. Keira MillsWhen I first knew that we had to complete science and technology as a subject this semester, my first reaction was ??? Here we go again???.

I had an image imprinted in my mind that science and technology is a dreaded subject where the classroom seems to become a dark and gloomy and time just stands still. Even saying the words ??? science and

technology??™ while writing this forum entry makes me think, ??? If I have to construct one more model of the solar system I am going to scream! My past experiences in science and technology have been rote learning HUGE amounts of information that didn??™t make sense and was just a jumble of letters on a white piece of paper. ALTHOUGH, after leaving the science and technology tutorials in the first week of semester, I walked out thinking about science and technology in a completely different frame of mind. I couldn??™t believe that I actually enjoyed completely and participating in the experiments. From the tutorials I had learnt that Science and Technology can be fun by taking a constructivist approach. Santrock (2007) states children learn best when they are active and seek solutions for themselves.

This was evident in my instance where I was actively involved in my learning but completing the experiments. In teaching a subject such as Science and Technology I believe that teachers need to facilitate, rather than direct learning. Effective teachers design situations that allow students to learn by doing (Santrock, 2007 p.

206). In conclusion, I firmly believe that while teaching Science and Technology, constructivist approach to learning is how we as teachers have to think to allow our students to discover, explore and enjoy the concepts of Science and Technology. ??? 4. Erin BromageA constructivist approach to science teaching, and as a theory to learning, is becoming a fashion of the twenty first century. However, this philosophy to learning has widely been critiqued by the scientific community as being a practice which is being used as teachers are overwhelmed by challenges such as pupils lack of interest in

science, teachers inadequate knowledge of science, and schools lack of resources (Matthews, 1997, p.

10). Further Skamp (2004) adds that some critiques label the constructivist approach as being coercive and contradictory as teachers malign students conceptions, engineer enquiries, and regulate conclusions (Skamp, 20047, p. 12). This in turn is perceived as altering the human construction of knowledge as teachers are actively constructing student??™s conceptions. Taking into account the critiques point of view to a constructivist approach, (that it stems from inadequately educated teachers, and students unwillingness to learn), I personally believe that in a society that has changed morals, values, and educational objectives/aims to last century, this method of teaching is a way to engage both teachers and students, and additionally gives both a sense of ownership and motivation in the construction of scientific knowledge and conceptions.

Skamp, K. (2004). Teaching primary science constructively. Australia: ThompsonMatthews, M. (1997) Philosophy and constructivism in science education. [Electronic Version], 6(10), 5-145.

Kylie ScottLearners are not viewed as passive but seen as purposive and ultimately responsible for their own learning. They bring their prior conceptions to learning situations. Learning is considered to involve an active process on the part of the learner. It involves the construction of meaning and often takes place through interpersonal negotiation. Knowledge is not ??? out there??™ but is personally and socially constructed. It may be

evaluated be the individual in terms of the extent to which it ??? fits??™ with their experience and is coherent with other aspects of their knowledge.

Teachers also bring their prior conceptions to learning situations not only in terms of their subject knowledge but also their views of teaching and learning. Teaching is not the transmission of knowledge but involves the organisation of the situations in the classroom and the design of tasks in a way which promotes scientific learning. The curriculum is a program of learning tasks, materials and resources from which students construct their knowledge. (Driver, R.

1988, p. 138 Constructive perspective). Important aspects of teaching- providing a supportive environment in which children cooperatively construct understanding is the key to developing a lifelong interest in science. By creating a challenging and supportive atmosphere in the classroom, will enable students to question you and their classmates, freely without fear of ridicule.