Creating a tool to evaluate teaching materials for older beginner piano students through the lens of constructivism

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Abstract

This paper describes the creation of an evaluative tool that aims to measure the degree to which constructivism is facilitated within the teaching materials created for older beginning piano students (twelve to seventeen years of age). Literature exploring the published teaching materials available for teaching piano includes content analysis, comparisons of tutor books and music reading approaches. The majority of research focuses on young children under eleven years of age, tertiary students and adult learners. Little research has critically examined the materials created for the older beginner piano student.

Additionally, research in music education has explored various forms of constructivism but this research is rarely piano specific and generally represented by qualitative or small quantitative studies. Constructivism related to teaching piano to students aged twelve to seventeen years has received little attention.

This paper unpacks the research and methodology that underpins the creation of an evaluative tool designed to explore the extent to which constructivism is facilitated and supported in the published teaching materials for older beginner piano students. The creation of an evaluation tool anchored in constructivism is central to a larger study exploring the resources used by Australian piano teachers when teaching older beginner students.

Key words: piano teaching, constructivism, older beginners

Introduction

Literature investigating the materials created for teaching piano has explored a range of foci. Comparisons of piano method books, analyses of learning activities, a stock take of repertoire and discussions debating the different approaches to learning piano are well researched areas (Ballard, 2007; Chen, 2013; Lu, 2012; Sundell, 2012; Uszler, 2000). However, the majority of research exploring various aspects of piano teaching has predominantly related to young students eleven years and under, tertiary music students and adult learners (Carey & Grant, 2015; Jutras, 2006; Yang, 2015). Research targeting the older beginner piano student, twelve to seventeen years of age is scarce.

Evidence suggests that the teacher's choice of teaching materials and repertoire significantly shapes the activities, tasks and interactions within the piano lesson (Emond & Comeau, 2013; Van Sickle, 2011). While many researchers provide compelling evidence that constructivism supports an efficacious and successful approach to learning, research that specifically explores the implications of constructivism in relation to the teaching materials created for beginner piano students aged twelve to seventeen is scant (Chmurzynska, 2012; López-Íñiguez, 2015; Scott, 2006, 2011, 2012).

Defining Constructivism

Constructivism as a theory of learning evolved from the work of John Dewey (2004), Jean Piaget (1954, 1979) and Lev Vygotsky (1980). Interpreted

liberally, constructivism accommodates a range of manifestations (Ackermann, 2001; Derry, 1996; McPhail, 2016, 2017). The literature debating the many interpretations of constructivism reveals the present-day ambiguity of the term (Morford, 2007; Phillips, 1995). While there are several similarities across the varied interpretations of constructivism, there are also significant differences (Sjøberg, 2007). It is beyond the scope of this paper to discuss and define the different forms of constructivism. Hence, seminal discussions of constructivism will provide the basis of a comprehensive definition of constructivism that will serve as a lens for the creation of the evaluative tool (Confrey, 1990; Fosnot, 2005; Morford, 2007; Wadsworth, 1996; Wiggins, 2007).

In the broadest definition, constructivism defines learning as a process in which the learner constructs or builds understanding and knowledge upon existent perceptions and experience (Cobern, 1993; Schunk, 2012; Wiggins, 2004; Windschitl, 2002). For the purposes of this study, constructivism describes an active process that involves an individual's personal construction of understanding and knowledge through cognitive procedures such as questioning and problem-solving, as well as the social and collaborative interactions of dialogue and shared experiences (Bonk & King, 2012; Wiggins, 2007, 2016). Wiggins (2016) stresses that the provision of meaningful interactions between learners, peers and teachers is crucial. Peers and teachers often provide support or scaffolding for successful learning. Scaffolding, a term coined by Jerome Bruner and associates, refers to the temporary support provided to help students complete tasks beyond their level (Bruner, 1961,1996). The support or scaffold is removed once the learner can function independently (Kupers, van Dijk, & van Geert, 2015; McPhail, 2010).

In constructivism, knowledge and learning are understood to be an individual's non-objective constructed understanding. Knowledge and learning are influenced by the learner's personal cognitive lens which is shaped by age, stage of development, personality, culture, daily experiences, prior learning and a range of other factors (Morford, 2007). A person's cognitive lens impacts the way in which she or he learns (Gordon, 2009; J Wiggins, 2004). It is impossible to account for the exact composition of every individual's personal cognitive lens but, substantial research by Fleming and Baume (2006) and Fleming (1995) suggests that there are a range of preferred ways of learning described as learning styles, which an individual may utilise to take in, interpret new information and build knowledge and skills.

According to Othman and Amiruddin (2010) learning styles take into consideration many of the same factors as those identified as part of an individual's personal cognitive lens. Gender, age, personality, heritage, environment, education, culture and community are deemed to influence each person's preferred styles of learning. It can be argued that an individual's learning style describes a significant aspect of her or his personal cognitive lens. For the purpose of evaluating the ways in which the learner's personal cognitive lens is accommodated in the teaching materials for older beginners, the VARK learning styles model developed by Fleming (1995, 2012) and Fleming and Baume (2006) is employed in the development of this evaluative tool.

The VARK learning styles model identifies four main learning styles and offers clear, established definitions of the ways an individual may approach learning that is, her or his personal cognitive lens. VARK also provides a set of criteria that can be used to determine whether the teaching materials accommodate different approaches thus a range of cognitive lenses as represented by different learning styles (Fleming & Baume, 2006; Fleming, 1995). While research does not specifically link constructivism with learning styles, Boatman, Courtney and Lee (2008) and Yiatrou, Polycarpou, Read and Zeniou (2016) allude to the importance of acknowledging different learning styles in constructive learning.

The argument to include the VARK learning styles

as a means to evaluate the materials in terms of an individual's personal cognitive lens is anchored in the core assumption within constructivism that, in order to learn the learner actively constructs and builds knowledge. New information and new experiences must to be accessible to the learner. If new knowledge is not presented in ways comprehensible to the individual's preferred learning styles that is, compatible with her or his personal cognitive lens, the opportunity to construct knowledge may not occur (Biedenbender, 2012; Fleming, 2006). Despite research which has recently challenged the validity of learning styles for example, De Bruyckere, Kirschner and Hulshof (2015) who argue that learning styles may be used to rigidly classify learners, Boatman, Courtney and Lee (2008) suggest that new information, concepts and skills are best presented in a variety of ways in order to maximise learning outcomes.

The VARK model, describes four types of learning styles: Visual (V), Aural (A), Read/Write (R) and Kinaesthetic (K) (Fleming & Baume, 2006; Fleming, 2012). A visual learner is described as one who must see something to learn. Such students enjoy symbols and diagrams and prefer to learn by watching and observing. The auditory learner learns best through listening, discussion, talking and lectures. Auditory learners prefer to hear information and ideas either by words or, in the case of music, by example. Readers/writers prefer to learn by reading or writing. Such students like making lists, writing diaries and reading information. Kinaesthetic or tactile learners, learn through moving, doing, touching and feeling. Often these students find it difficult to be still for long periods of time. They need activity in order to learn. Repetition and physicality are their best tools for learning (Fleming, 2012; Powers, 2016).

The choice of the VARK model as part of the evaluative tool rests in several factors. First, the VARK model identifies different cognitive lenses by acknowledging the varied ways in which learners acquire, receive new information or experiences as well as the processes used to construct new knowledge and understanding (Othman & Amiruddin, 2010). Second, the VARK questionnaire distinguishes between two types of visual learners: those who like to work with text and those who prefer to work with graphs, symbols and diagrams (Fleming & Mills, 1992). This distinction is significant for the music student, as it implies a need for both text-based information and symbols or diagrams as part of the printed materials. Third, the VARK model distinguishes between mild, strong and very strong preferences of learning (Boatman, Courtney and Lee, 2008). Fourth, the VARK model acknowledges that some learners are bimodal, that is they have more than one preferred style. Beheshti (2009) emphasises that when the studio teacher can identify a student's learning style or styles, the curricula and learning activities can be designed to accommodate this, making learning more effective. Fifth, the option for the learner to develop and employ less-preferred learning styles is acknowledged, thus preferences for a particular learning style are viewed as flexible and adaptive (Fleming & Mills, 1992). This matches well with the fluid nature of knowledge as understood by constructivism. Sixth, Murphy, Gray, Straja, and Bogert (2004) argue that the VARK learning style model provides a medium for self-knowledge and self-awareness, which can enable more effective learning. Pritchard (2013) argues that when an individual becomes aware of her or his own thought processes this will, with encouragement, develop metacognitive skills, that is a self-understanding of the ways in which one learns. Learning is significantly shaped by the choice of teaching materials and this infers that the degree to which the learning materials accommodate each student's personal cognitive lens in terms of learning styles is important (Albergo, 1990; Emond & Comeau, 2013; Pritchard, 2013).

Constructed explanations are conducted through each individual's personal cognitive lens and achieved by the cognitive acts of the learner who builds on her or his existent knowledge and previous experiences (Gordon, 2009; Wiggins,

2004). Characterised by active student responses, constructivism involves cognitive procedures including questioning, the application and transferal of knowledge and problem solving (Wadsworth, 1996). Alongside the cognitive processes integral to constructivism is the inherently social nature of teaching and learning (Lutz & Huitt, 2004; Shively, 2015; Wiggins, 2016). The social aspects of meaningful learning influence and assist knowledge construction and stem from the socio-cultural learning theories developed by Vygotsky (1978), which emphasise collaboration, social interactions, peer learning, discussion and shared experiences. Constructivism acknowledges the social aspects of learning as well as the cognitive enactments of the individual.

Constructivism relates to how and what the individual learns. McPhail (2017) identifies that the role of teacher-led, student-centered learning is sometimes necessary in musical learning, where there is a requisite pre-determined body of knowledge. Thus, the teacher's role is pivotal in enabling the student's everyday social knowledge and prior learning to guide her or him towards new learning (Karpov, 2003). McPhail (2017) argues that instructions, imitation and mimcry as a means of teaching are not necessarily incompatible with constructive learning. If the student actively synthesises information received from instruction or mimcry and links it to prior knowledge to construct new understanding, then retaining and extending her or his knowledge base is achieveable (Powell & Kalina, 2009; McPhail, 2016, 2017). During the process of creating the evaluative tool, it became important to include instructional approaches, for example; directions, closed questions and instructions, which though not typical of constructivism, are not necessarily incompatible with constructive learning (Chmurzynska, 2012; McPhail, 2016, 2017; Ertmer & Newby, 1993).

Constructivism perceives learning as an ongoing organic process, not a product to be achieved, nor something to be received by the individual (Brooks, 1999; Morford, 2007; Shively, 2015). Knowledge is considered emergent, developmental, adaptive and changeable as a result of new experiences and new information (Fosnot & Perry, 1996; Windschitl, 2002). Research by Hood (2012) and McPhail (2013) identified that a focus on the process of learning enabled the student to own her or his learning, requiring a shift from teacher instructive approaches to more active, interactive, student driven processes. Both researchers discovered that a focus on the learning process encouraged, through self-reflection and self-evaluation, the development of self-regulation strategies.

Self-regulation skills are essential for all musicians (S. Nielsen, 2001). Self-regulation describes an activity of self-reflection and self-evaluation used by the learner so as to select, use, test, discard and change learning strategies in order to learn effectively (McPherson & Renwick, 2001; Nielsen, 1999). Self-regulation also important for continued musical learning, is a key ingredient for the development of meta-cognition. Meta-cognition is defined as an individual's self-awareness of how she or he learns (Efklides, 2008; Schunk, 2012). Lopez-Iniguez and Pozo (2016) argue that meta-cognition is more likely to be developed through a learning approach founded in some form of constructivism. Long-term learning and engagement in music making requires the piano student to develop meta-cognitive skills (Colombo & Antonietti, 2017; Hallam, 2001). Countryman (2012) and Hood (2012) found that an emphasis on the process of learning facilitated both the acquisition of musical skills and the development of meta-cognition, self-regulation, student ownership and goal setting. In research by Ferenc (2015) students discovered that how they learned was as important and what they learned.

A focus on the processes of learning does not mean that the outcome or product is not important, but instead ensures that the realisation of the product is not achieved at the expense of the process of learning. In tandem with a focus on the processes of learning, the sequence and pace of learning assumes importance in constructivism. The premise that learning is an activity whereby

the individual links new ideas to her or his present knowledge in order to construct understanding, necessiates the creation of teaching materials that enable sequential learning (Null, 2004; Wiggins, 2007).

In summary, a comprehensive definition of constructivism describes an approach to learning that is teacher-led, student centered, accommodating the learner's personal cognitive lens. The structure of the learning tasks ensures that new information and experiences are linked to previous experiences, so as to build on prior knowledge and prior learning.

Learning requires cognitive procedures such as questioning, analysis, problem solving and knowledge transferral. Learning also involves social activities including discussion, collaboration, shared experiences and when needed scaffolding. Constructivism focuses on the process of learning and an acknowledgement that understanding evolves and changes. Constructivism insists that effective learning occurs when new knowledge is presented in context, linked to prior knowledge so as to lay a foundation for new understanding. The pace and sequence of learning, that is the rate of and order in which new information, concepts and skills are introduced is vitally important.

Creating the evaluative tool

The evaluative tool, when applied to resources for older beginner piano students, is designed to identify and measure the salient features of constructivism as defined earlier in this paper. The evaluative tool is comprised of six categories each embracing a key aspect of constructivism identified previously. The six categories: the approach to learning, the structure of learning tasks, cognitive learning experiences, social learning experiences, the focus of learning and the learning sequence and pace, provide the frame for the evaluative tool. Within each category, descriptors expiate the specific characteristics of constructivism and three different measurement procedures are used to provide a system for describing how each descriptor is reflected in the materials. The application of the evaluative tool identifies and records the extent to which each descriptor is present within any set of created piano teaching materials. The accumulation or total number generated by adding the total number of pages representative of each descriptor indicates the aspects of, and degree to which constructivism is supported by the set of printed teaching materials created to teach piano to older beginners.

Category one: Approach to learning

Category one assesses the degree of learner centredness in relation to each learner's personal cognitive lens in terms of the VARK learning styles.

Descriptors

V: Visual activity, e.g. seeing, symbols, diagrams

A: Aural based activity, e.g. listening

R: Reading or writing, text based

K: Kinaesthetic, e.g. playing piano.

Measurement

An assessment of the way the task is presented, the requirements of the activity and the implied student's responses is completed in reference to each learning style: visual, auditory, reading or kinaesthetic. For example: does the experience involve or require interpretation of symbols, reading text, listening or doing? Is the student able or required to feel, move, touch, play in order to complete the set activity? Tasks and activities may utilise multiple learning styles and more than one box will be ticked to reflect this. The total number of pages using each learning style is counted and placed in the relevant boxes. Table one shows how the materials approach learning and accommodate the student's personal cognitive lens as represented by different learning styles.

Table 1.

Approach to learning: Personal cognitive lens, Learning Style	Total numbers of pages using each learning style used in materials			
Descriptors I. V: Visual activity e.g. symbols, diagrams II. A: Aural based activity e.g. listening III. R: Reading, text based, writing IV. K: Kinetic, e.g. playing piano	**V**	**A**	**R**	**K**

Categories two to five

Categories two to five identify aspects of contemporary constructivism in terms of the structure of learning tasks, the range of cognitive learning experiences, the inclusion of social learning experiences and the focus of learning.

Measurement

In categories two to five, a three-point Likert scale is used to indicate how the tasks in each unit may facilitate constructivist learning. The total number of pages for each descriptor is matched against one of the measures described below.

Materials alone facilitate a contemporary constructive learning approach.

1. Materials may offer scope for contemporary constructive learning, but the materials alone do not clearly provide these learning opportunities.
2. Not in the lesson book, may be provided in the supplementary materials.

An example of each category is provided in Tables 2 to 5.

Category two: Structure of learning tasks

Category two examines the opportunities for personal cognitive acts in relation to the learner's cognitive lens in terms of age, stage of development, daily experiences and in relation to prior learning and prior knowledge (Lopez-Iniguez & Pozo, 2016; Morford, 2007).

Descriptors

- New knowledge and skills clearly links to the student's age, stage and daily experiences. (Shively, 1995; Wiggins, 2004).
- New concepts and skills are directly linked to, or build on, prior learning and experiences. (Scott, 2006).
- Teacher directive, transmissive, instructional activities. The activity or task is instructive,

Table 2.

Structure of learning tasks	**Materials alone provide for constructive learning approach**	**Materials, may offer scope but alone do not clearly provide constructive learning opportunities**	**Not in the lesson book, may be provided in the supplementary materials**
New knowledge and skills clearly links to the student's age, stage and daily experiences.			
New concepts and skills are directly linked to, or build on prior learning and experiences.			
Teacher directive, transmissive, instructional activities: Directions, closed questions, memorization, rote learning.			

Table 3.

Cognitive learning experiences	Materials alone provide for constructive learning approach	Materials, may offer scope but alone do not clearly provide constructive learning opportunities	Not in the lesson book, may be provided in the supplementary materials
Questions and analysis: Open ended questions, inquiry and analysis that promote active student responses.			
Application and transferal of skills and knowledge.			
Problem solving: Students encouraged to identify problems and find solutions.			

imitative, or requires memorisation and rote learning (Boghossian, 2006; Gordon, 2009).

Category three: Cognitive learning experiences

In category three, the types of cognitive learning experiences and the quantity of active responses required are assessed (Confrey, 1992; Sawyer, 1999; S. Scott, 2006; Scruggs, 2009).

Descriptors

- Questioning and analysis. The use of open questions that prompt students to actively respond, inquiry and analyse (Cobb, 1994; Miller, 2012).
- Application and transferal of skills and knowledge. Students are required to use acquired knowledge in order to understand new information or transfer what is known to interpret new settings (Ferenc, 2015; Freer, 2009; Scott, 2010).
- Problem solving. Students must identify problems and find solutions (McPhail, 2013).

Category four: Social learning experiences

Category four examines the structure of the learning experiences, in terms of the social and collaborative learning experiences, the evidence of scaffolding and peer learning opportunities (Brooks & Brooks, 1999; Brooks, 1987; King, 1993; Wiggins, 2004).

Descriptors

- Discussion. Opportunities are provided for students to engage in verbal debate and explain or demonstrate their understanding (Freer, 2009; Scott & Palincsar, 2012).

Table 4.

Social learning experiences	Materials alone provide for constructive learning approach	Materials, may offer scope but alone do not clearly provide constructive learning opportunities	Not in the lesson book, may be provided in the supplementary materials
Discussion: Opportunities for students to engage in verbal debate, explain or demonstrate their understanding.			
Collaborative learning opportunities: Evidence of peer learning.			
Scaffolding: Evidence of temporary support to enable student learning.			

Table 5.

Focus of learning	Materials alone provide for constructive learning approach	Materials, may offer scope but alone do not clearly provide constructive learning opportunities	Not in the lesson book, may be provided in the supplementary materials
Self-reflective, self-evaluation tasks: Activities and problem solving tasks that encourage the development of self-regulation and meta-cognition.			
Student ownership of the learning: choices of learning experiences, repertoire and pace of learning offered. Options for creative music making.			
Goal setting: Opportunities for personal goal setting.			

- Collaborative learning opportunities. Peers and teachers are engaged during the learning experiences. Collaborative processes are included for example: duet opportunities and peer learning (Karpov, 2003; Sawyer, 1999; Wiggins, 2004/2007).
- Scaffolding. Evidence of temporary support to enable student learning (Mason, 2012; Morford, 2007; Murphy & Messer, 2000).

Category five: Focus of learning

Category five evaluates the focus of learning as either process driven, product focused or both. This category also explores how the materials acknowledge the developmental, emergent, adaptive and changeable nature of knowledge (Cobern, 1993; Wiggins, 2007). This category explores the ways in which the materials enable the learner's conceptions to change and develop through the encouragement of meta-cognition through self-reflective tasks, the development of self-regulation skills, the promotion of student ownership and personal goal setting.

Descriptors

- Self-reflective, self-evaluation tasks. Activities include problem solving and encourages self-evaluation and the development of meta-cognitive awareness (Jeanneret, Leong & Rosevear, 2003; Lopez-Iniguez & Pozo, 2016; Miksza, 2012; Nielsen, 2001; Veenman, Prins, & Verheij, 2003).
- Student ownership of the learning. There is evidence that the student has choice in terms of the learning experiences, repertoire and pace of the learning. There are options for creative music making, for example: improvisation, composition or performance (Ferenc, 2015; Morford, 2007).
- Goal setting. The exercises allow for personal goal setting and the development of self-regulation skills. (McPhail, 2013; McPherson & McCormick, 1999).

Category six: Learning sequence and pace

This involves an overview of the entire book as a set of teaching materials and the extent to which skills and concepts are logically introduced and revised.

Descriptors

- Prior learning provides the basis for new understanding and prepares for the next step in the learning sequence (Wiggins, 2004).
- New information is presented in context. The

Table 6.

Learning sequence and pace.	Sequence builds clearly on previous material.	Sequence builds on previous material but is restricted to one learning style.	Sequence builds on previous material but progress is rapid.	Sequence includes revision, but the revision is included with the introduction of a new concept.	Over lapping introduction of new concepts. Multiple new concepts or skills introduced simultaneously.	Does not directly link previous to new concept.
Connects with prior learning and lays the foundation for future learning.						
New information is presented in context.						
Revision, consolidation, application of skills and knowledge.						

sequence of learning enables the learner to understand how the new parts connect with the whole. People are best able to construct understanding when new information is presented in context (Wiggins, 2004).

- Revision, consolidation, application of skills and knowledge. New concepts are revised and revisited in different ways, including the application of knowledge to new contexts (Countryman, 2012; Scott, 2006).

Measurement

A six point Likert scale is used to indicate the way in new concepts are introduced, revisited, and explored. The total number of pages for each descriptor are matched against one of the below measures.

- Sequence builds clearly on previous material and lays a foundation for further learning.
- Sequence builds on previous material but is restricted to one learning style.
- Sequence builds on previous material but progress is rapid.
- Sequence includes revision, but the revision includes the introduction of new concepts.
- Over lapping introduction of new concepts. A number of new concepts or skills are introduced simultaneously.
- Does not directly link previous to new concept.

Conclusion

The creation of the evaluative tool entailed a comprehensive description of constructivism in terms of the approach to learning, the structure of learning tasks, the cognitive and social learning experiences, the focus of learning and the sequencing and pace of learning new concepts and skills. These core areas formed the six categories that provided the frame within which a measurement of the features or descriptors that comprise constructivism were listed. Within each category the specific descriptors detailed the types of activities and tasks that facilitate contemporary constructivism in the context of the teaching materials used in the piano lesson. A measurement device of tick boxes determining the approach to learning, a three point Likert scale to evaluate the structure of learning tasks in terms of the cognitive and social learning experiences and the focus of learning, and six point Likert scale to examine the sequencing and pace of learning provides the

means for a page-by-page evaluation of a set of teaching materials. The total number of pages for each descriptor reveals the extent constructivism is supported and facilitated by the teaching materials.

There is a dearth of information in relation to both the teaching materials for older beginner piano students and constructivism in piano learning education. Research strongly indicates that the choice of teaching materials significantly impacts the learning process. However, it is unknown whether the selected teaching materials encourage constructivism. The creation and application of the evaluative tool provides a means of establishing the degree to which a commercially produced set of teaching materials may encourage constructivism within the learning experiences of older beginner piano students.

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