ECONOMICS TEACHERS' USE OF TOPIC SPECIFIC PEDAGOGICAL CONTENT KNOWLEDGE IN TEACHING MARKET DYNAMICS

Ijeoma Chidinma Ogbonnaya, Andile Mji, Oliva Neo Mafa-Theledi, Beatrice Ngulube
Tshwane University of Technology, South Africa
E-mail: Ijey5000@yahoo.com, mjia@tut.ac.za, lebelooa@tut.ac.za, ngulubeb@tut.ac.za

Abstract

The poor learners' understanding of specific topic 'Market Dynamics' (MD) is a concern in South Africa secondary schools and so it is globally. Many researchers and education stakeholders in South Africa point to the need to use TS-PCK to improve learners' understanding of MD. This research aimed to examine economics teachers' teaching of Market Dynamics (MD) in order to understand how the teaching and learning of MD could be improved using topic Specific PCK. Using Mavhunga's TS-PCK as the theoretical framework. Two TS-PCK components were examined in the research namely, content knowledge (What is that makes a topic difficult to teach?) and representations were used to gain an in–depth understanding of teachers' use of TS-PCK in teaching MD. It was a descriptive case study design. Purposeful samples of three economics teachers of 10th, 11th and 12th grade were selected. A semi-structured interview consisting of 18 items was used to generate data for the research while a qualitative data analysis technique, namely thematic analysis was used to analyze the data generated. The results showed that the three economics teachers sampled for the research were able to use their TS-Content Knowledge adequately in different Content Knowledge domains to understand what makes a topic difficult to teach or learn. The result also showed that the participating teachers identified difficult areas that are challenging to teach in the topic of MD but were unable to explain and give cogent reasons why those areas were challenging for learners to understand. Further results on teachers' use of TS-PCK based on 'representations' revealed that the teachers effectively used analogies and examples in teaching market dynamics but struggled to find activities to illustrate some of the concepts of market dynamics. The research recommends that economics teachers should be provided with more structured opportunities to help develop their topic specific pedagogical content knowledge of the school level content as part of their professional development.

Keywords: *content knowledge, economics teachers, pedagogical content Knowledge, topic specific pedagogical content knowledge, market dynamics.*

Introduction

There has been a shift over time from the much emphasis placed on the importance of teacher knowledge, subject matter knowledge to knowledge needed to transform the content of a particular topic into teachable form using pedagogical reasoning (Loughran, 2019; Loughran et al., 2006; Rollnick et al., 2017; Mavhunga, 2012; Shulman 1987). This knowledge transformation has been described in the literature as "Topic Specific Pedagogical Content Knowledge" (TS-PCK) (Mavhunga, 2012, Mphathiwa, 2015; Veal & MaKinster, 1999). These researchers noted that in order to translate this knowledge into teachable form, there must be transformation using pedagogical reasoning. Pedagogical reasoning includes pedagogical

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knowledge, knowledge about content, the teaching styles, methods, and the approaches to represent the topics that usually differ. These differences legitimate the need for developing Topic-Specific PCK as an instructional paradigm for teachers.

Teachers in other subject domain are aware of the importance of TS-PCK and have modeled how TS-PCK is used to effectively improve the teaching and learning of specific topics (Azam, 2019; Rollnick & Mavhunga, 2017). However, research in economics education still focused on the generic PCK (for e.g. Ayers, 2016; Kuhn et al., 2020; Kuhn et al., 2016: Kruger, 2018; Melanie, 2019; Ng & Chan, 2014). The generic PCK unlike the Topic-Specific PCK that is associated with reasoning through a particular topic has not helped enough to identify the observed competency specific for each economics topic. Thus, economics teachers who do not have the topic specific knowledge base for teaching specific topics struggle to teach challenging topics.

What is largely missing from economics education literature is research into the specific knowledge needed for teaching specific topics and how this knowledge is drawn upon during teaching. More so, economics teachers' TS-PCK for teaching specific topics is not well documented. In order to understand the knowledge needed for teaching specific economics topics, it is important to examine how economics teachers' knowledge base has been transformed to topic specific knowledge for teaching specific topics, and how that knowledge informs their teaching. Gaining more insight into the actual use of TS-PCK for effective economic instruction may provide a more complete understanding of teaching specific economics topics.

In South Africa, poor learners' understanding of specific topic 'Market Dynamics' (MD) is a concern. Learners face challenges in understanding most basic economics concepts in MD, thus they often considered the content dry and overly mathematical (Ayer, 2015). Research showed that learners struggle and do not have adequate conceptual understanding of Market Dynamics concepts (Ayers, 2015; Aguiló et al., 2016). Learners' challenges in understanding MD brought in a more flexible and connected way to look at the teaching of MD in its topic form using Topic Specific PCK. The challenges have indeed placed demands on economics teachers to facilitate learners' understanding of the topic MD using TS-PCK. Therefore, understanding how economics teachers could improve on the teaching of MD using TS-PCK takes on greater urgency. In response to these challenges, there is a need to examine economics teachers' use of TS-PCK in teaching MD. A deeper understanding of how economics teachers' topic specific knowledge is drawn upon when teaching specific topics will provide important insight into the teaching and learning of MD. It will further add another layer of analysis to what we already know about the teaching and learning of Market Dynamics. This is because the topic MD is one of the most fundamental topics in economics education comprising of basic economic concepts that forms the bases for understanding other topics in economics. It is a representation of the real market structures that require manipulation of different graphs.

Since the topic MD with its graphical representations and analysis remains an important topic that permeates much of the economics studied in the Further Education and Training (FET) band in South African schools, there is a need to understand how it could be better taught in a topic specific form. Many research studies on the teaching of MD have been predominantly discipline-specific (Walstad & Watts, 2015), and many more on concept-specific (Rupp, 2010; Méndez-Carbajoa & Asartab, 2017). These research studies argue that the teaching of MD should go beyond teaching MD to their learners in its concept forms. Teachers do not have to respond to demands from just explaining MD concepts but have to respond to the demands with the teaching of MD that are associated with the topic specific pedagogical content knowledge (TS-PCK) of these concepts (Shulman, 1986). For instance, teachers need to understand how TS-PCK could be used in a topic to understand what makes the topic easy to teach or learn. Teachers also need to know the different ways in which MD concepts are represented; to know which specific examples, activities or analogies to use.

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Therefore, the research into economics teachers' use of TS-PCK to improve learners' understanding can bring useful recommendations not only to the teaching of the topic Market Dynamics but also to other challenging specific topics in economics.

Research Problem

The poor learners' understanding of specific topic 'Market Dynamics' (MD) is a concern in South Africa secondary schools and so it is globally. Many researchers and education stakeholders in South Africa point to the need to improve learners' understanding of MD using TS-PCK but there is little evidence in South Africa to show that much progress has been made at learners' understanding of the topic Market Dynamics in our secondary schools. Evidence from the latest 2015 test of economics literacy in South Africa on learners' understanding of basic economics concepts revealed that learners are unfamiliar with most basic economics concepts contained in the Test of Understanding Economics in South Africa (TUESA), such as the concepts of demand, supply and elasticity on the topic of Market Dynamics (Fourie & Krugell, 2015). TUESA results indicated an overall economic literacy score of the basic economics concepts of 50.9 per cent, with 46.38 per cent in microeconomics and 55.61 per cent in macroeconomics (Fourie & Krugell, 2015).

Across the world, there are concerns about improving learners' understanding of the topic Market Dynamics, as majority of secondary school learners do not understand the most basic economics concepts such as the impact of supply and demand on consumer prices in the topic Market Dynamics (Ayers, 2018). Moreover, learners complain of the dry and abstract nature of MD (Méndez-Carbajoa & Asartab, 2017; Hansen, 1984). Learners' low level of understanding of the basic economic concepts could be attributed, at least in part, to less professional development training of economics teachers in content knowledge and pedagogy (Schug, Harrison, & Clark, 2012), perhaps this calls for a need to examine deeply economics teachers' use of topic specific knowledge base for teaching in the areas of content and pedagogy for MD teaching. A review of literature for economics education quickly showed a scarcity of research on teachers' use of Topic Specific PCK to improve specific economics topics such as Market Dynamics. Considering these concerns, there is a need to understand how economics teachers use their topic specific PCK to teach Market Dynamics and how it informs their teaching.

Research Focus

The focus of this research was the use of TS-PCK in teaching Market Dynamics by economics teachers. Based on other TS-PCK studies from other subject domain, learners' understanding of Market Dynamics could be improved using teachers' content knowledge and representations.

Research Aim

The aim of this research was to examine economics teachers' teaching of Market Dynamics (MD) in order to understand how the teaching and learning of MD could be improved using TS-PCK.

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Research Questions

This research responded to the following research questions:
1. How do economics teachers use their Topic Specific 'Content Knowledge' to teach Market Dynamics?
2. What TS-PCK do economics teachers demonstrate when using 'representations' in teaching Market Dynamics?

Theoretical Framework

Mavhunga (2012) TS-PCK model was adopted as the theoretical framework for this study. Due to limited research on PCK specifically for economics education, there is a need to rely on close fields such as mathematics and sciences for a framework. Unlike the generic PCK model that focuses on the ability to transform subject matter knowledge for teaching, Mavhunga (2012) TS-PCK focuses on transformation of teachers' comprehension of content that translates into '*how*' a teacher teaches a particular topic. Mavhunga (2012) s' TS-PCK model consists of five components: Learner prior knowledge, teaching strategies, curricular saliency, content knowledge (what makes a topic difficult to teach?) and knowledge of representations. However, this paper focuses on two Mavhunga's TS-PCK components: Content Knowledge (What makes a topic difficult to teach?) and the use of representations.

Content Knowledge

Content Knowledge or 'What makes a topic difficult to teach or learn?' entails teachers' understanding of what is considered difficult or easy to teach and learn in a specific topic. Mavhunga (2012) preferred to refer content knowledge as 'what makes a topic difficult to teach?' and defined it as having the knowledge of understanding of difficult concepts in a particular topic. This suggests that a teacher should have adequate knowledge of the content first before understanding the concepts that are difficult to teach or learn. Akinyemi (2016) argues that knowledge of what makes a topic difficult to teach or learn entails teachers' knowledge of gate keeping concepts in any given topic that includes knowledge of the content. Akinyemi further argued that the understanding of the gate keeping concepts requires teachers' knowledge of the possible reasons for learners' misconceptions and prior knowledge. In other words, knowledge of 'what makes a topic difficult to teach or learn' is teachers' possession of good content knowledge that enables the ability to identify concepts that might be difficult to teach. Knowledge of the content helps to explore the problematic concepts in a given topic. Research has proved that teachers' knowledge of the content is an indicator of teachers' teaching effectiveness (Phelps et al., 2014).

Representations

Representations are various ways in which the subject matter can be denoted with the use of; examples, illustrations, analogies, simulations, metaphors, diagrams, tables and models Mavhunga (2012). The use of representations shows the ability of the teacher to understand learners' background experiences and misconceptions in order to use the right form of illustration/demonstration/symbols/pictures etc. to convey and present the meaning of the topic to their understanding. It also entails teachers' ability to use different forms of representations to explain concepts in a given topic. This explains why Shulman (1986) attached much importance to teachers' understanding of the use of correct representations in teaching specific topics.

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Economists commonly use analogies, examples and activities as forms of representations when teaching economics topics. Kumar and Rajaraman (2018) described analogy as a bridge between new inputs and existing knowledge. Analogy is a cognitive process of transferring information or meaning from a particular object (the analogue or source) to another particular object (the target) (Jonane, 2015). In this research, we use analogies as tools for teaching difficult MD concepts by connecting things unknown to things known in order to facilitate understanding of the topic. Researchers broadly refer examples as illustration of a larger class. Examples are explanations used in expressing general principle, the samples or examples of concepts (Gökbulut & Ubuz, 2013). In this study, examples are used to explain and give conceptual understanding to MD concepts thus finding relationships and making generalization so that the learners can learn better. Activities on the other hand could be described as learners' capability to learn through individual actions and experience in order to develop their ideas about the world (Çelik, 2018). In this research, we look at teachers' knowledge of the use of activity as a form of representation whereby teachers involve interactivity among learners through engaging them in physical and mental exploration to discover meanings of difficult concepts. Teachers' knowledge of activities is the ability of the teachers to use the correct activity that suits a particular concept to facilitate learners' understanding of a specific concept.

Research Methodology

Research Design

A descriptive, qualitative case study was used to examine economics teachers' use of TS-PCK in teaching MD. The reason for choosing a case study for this research was to thoroughly describe each case within their context. Qualitative research methods permit an in-depth research of single or small number of units at a point (over a period) in time (Hsieh & Shannon, 2005). Consequently, to present an in-depth perspective of knowledge for teaching held by each economics teacher on how they draw upon their knowledge when teaching MD. Within the research, the researchers examined three economics teachers' use of TS-PCK in teaching Market Dynamics for the 10th, 11th and 12th grades, in particular their content knowledge and representations. Three government secondary schools located at Tshwane North District of South Africa were selected for this research. These schools are made of predominantly English-speaking learners of mixed genders. This research was conducted in different stages; preparing the interview instrument, conducting the interviews, and analyzing the results. It also involved proving the trustworthiness of the research through credibility, dependability and transferability and then presenting the results of the analysis to describe the themes that emerged from teachers' content knowledge and the use of representations. The data collecting was conducted in 2018, while data analysis was conducted in 2018-2019.

Participants

The research was conducted in secondary schools in Tshwane North District of South Africa. Using a purposive sampling technique, the three economics teachers selected for the research were female participants for 10th, 11th and 12th with their names replaced with pseudonyms as Mary, Jane and Lerato respectively. The selection of only female teachers was not intentional but was determined by the selection criteria and procedures adopted. These teachers were of age 39, 42 and 40 years and with 12, 14 and 16 years respectively of teaching experience in economics. Upon selection, these three teachers met the two selection criteria set out for selecting the participants for this research. These criteria are; the teachers should possess at least 5 years of teaching experience in economics at secondary school level. Teaching

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experience was set as a criterion based on the assumption that the teachers have already developed TS-PCK in teaching MD over the years of teaching. The teachers should obtain at least a tertiary education qualification for teaching economics. One unique characteristic of these teachers is that they have all taught a particular grade level for five years and were commended as high achievers with outstanding awards as economics educators. While the three economics teachers earned their Bachelor of Science degree in economics and a Post-graduate in Education Certificate (PGCE) in economics, Jane the grade 11 teacher had obtained an additional Master of Science degree in economics.

Ethical Considerations

Permission to conduct the research was first obtained from Tshwane University of Technology, South Africa which has set rules that had to be adhered to: approval letter was obtained from the research committee of the university and from the Department of Education (GDE) in the province. The participants of the research were asked to give consent to participate in the research and to be interviewed and observed while teaching as well as to have the information recorded. The purposes of the research were explained to the participants before administering the instruments. Participants were assured of confidentiality according to ethics rules.

Instrument

The instrument for this research was developed by the researchers. The interview protocol form (See appendix 1) consisted of two sections. Section 1 consisted of 10 items relating to teachers' biographical details: age, teaching experiences educational background and beliefs. Section 2 consisted of 8 items that related to details of teachers' content knowledge of MD and knowledge of representations. In all, the instrument comprised of 18 items. These instrument items were given to an expert in the field of economics to check for validity to ensure necessary questions that captured teachers' use of TS-PCK were asked. The expert provided feedbacks that reflected the true coverage of the instrument.

Data Collection

Data were collected through a semi-structured interview of the three participating economics teachers. Semi-structured interview was chosen to give a voice to the participant economics teachers in order to obtain the necessary data needed, especially unobservable data that help to follow-up interesting answers (Creswell et al., 2016). Consent form was given to each of the participant teacher to fill and give consent to participate in the research. The participant teachers all gave consents and availability to participate and choose their convenient times and venues where the interviews were conducted. All interviews were conducted in the school premises. Each participant's interview was audio-taped.

Data Analysis

Analysis of data entails breaking down the information gathered into elements in order to obtain responses to research questions (Sauro, 2015). Data were analyzed thematically under the two TS-PCK components: Content knowledge and representations. After the interview process, all audio recordings of the three participant teachers were separated in three different compact discs and were transcribed verbatim by the researchers. This helped the researchers to include

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all the non-verbal clues like silence, pause etc. which a typist may not have included. After the data transcription, member checking was adopted. The transcripts were given to each of the teachers to check and correct errors that might have occurred during transcriptions (Korstjens & Moser, 2018). The data analysis process followed some systematic stages for a case study. (1) 'open coding' which is the initial coding process that helped the researchers to retrieve quickly all data and text that show commonalities in order to group them in thematic ideas so that each theme can be examined together and different cases compared where necessary. (2) 'Axial coding' is the second stage of the coding process which entailed putting data in new ways, making explicit connections between categories and searching for relationships and patterns. The last stage of the coding process was the (3) 'selective' coding which involved the process of selecting and identifying the core category and making contrast and comparisons relating to other categories. The last process of the data analysis involved making sense of the data, which involved interpreting and presentation of the data and abstracting the findings from the categories. The researchers ensured dependability of the results by maintaining an audit trail that provided a clear description of the research process from the beginning of the research to the reporting of the results. Although transferability is limited in a case study, the researchers ensured that the results of the research can be applied to similar context by providing not only a thick description of the participants, the research design, the setting and background information but also the context of the research.

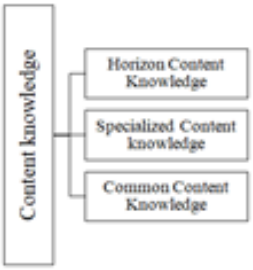
Research Results

To characterize the categories, the responses of the participant teachers have been taken from the interviews to make connections between the categories and to form patterns. Each category has been grouped together to form general descriptions.

Economics teachers' use of TS-PCK based on content knowledge

The TS-PCK of participant economics teachers based on their Content Knowledge are discussed under three sub-themes that emerged: Horizon Content Knowledge (HCK), Specialized Content Knowledge (SCK) and Common Content Knowledge (CCK) (see Figure 1).

Figure 1
The Sub-themes from economics teachers' TS-PCK content knowledge



Teachers' Content Knowledge regarding Horizon Content Knowledge (HCK)

Teachers' responses on Content Knowledge were categorized under **'Teachers' Topic Specific Knowledge connection to previous MD concepts'** to form the sub-theme 'Horizon Content Knowledge' (HCK).

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In the case of teachers' Content Knowledge as related to their HCK, the result showed that the teachers have the ability to make curriculum connection and integrate their economic content knowledge with learners' prior knowledge of concepts learnt in previous grades. The result proved that participant teachers demonstrated adequate use of HCK to teach MD. For example, all the teachers saw the need to revisit concepts in previous grades before teaching MD in current grade although each concept revisited was different across the teachers. Mary, the 10th grade teacher revisited the concepts of 'needs' and 'wants' which they learnt in the 7th grade, Jane, the 11th grade teacher revisited the concepts of 'circular flow' which was taught in the 10th grade while Mary, the 12th grade teacher revisited almost all the concepts in lower grades. However, the topic specific content knowledge of Mary and Jane as related to HCK seems to be better than that of Lerato because they were specific in identifying difficult concepts learners find challenging in previous grades unlike Lerato who revisits all concepts from previous grades. The comments by the participant teachers regarding their HCK are presented below:

> "*I revisit the concepts of 'needs' and 'wants'- their differences learnt in grade 7 and the concepts of 'goods and services' knowing that these simple concepts are basic concepts to understanding the topic of Market Dynamics in grade 10…"* (Mary)

> *"I recall to their memory their grade 10 work…when teaching 'Product and Factor Market' under Market Dynamics for example, I recall the 'circular flow' which they learnt in grade 10"* (Jane)

> "*…almost all the concepts in lower grades 10 and 11 are being revised in grade 12 in preparation for the June and matric exams"* (Lerato)

Teachers' Content Knowledge regarding Common Content Knowledge (CCK)

Teachers' Content Knowledge examined under the category of '**Teachers' Topic Specific knowledge of learners' understanding of common MD concepts'** formed a sub-theme 'Common Content Knowledge' (CCK).

As regard teachers' content knowledge based on CCK, the research revealed that the participant teachers used their TS-PCK to identify concepts that seem to be of common knowledge to learners. For example, Mary identified the concepts of 'Price' and 'Quantity'; Jane identified the concepts of 'cost' and 'revenue', while Lerato mentioned the concepts of profits and losses. Again, the differences in the nature of the concepts which were assumed common knowledge depended on the grade level concerned. It appears that what may be common knowledge at one grade may not necessarily be of common knowledge at another grade level. It also appears that the higher the grade level, the higher the content those learners tend to know as common knowledge. However, as common as these concepts may appear to learners, the teachers acknowledged the fact that these concepts need clarifications because when the economic meanings are lost, learners tend to be confused and it eventually leads to difficulty in understanding the topic. Teachers' responses to Content Knowledge as related to their Common Content Knowledge are presented below:

> *"…some economics concepts that are of common knowledge are 'Price' and 'Quantity' that we assume learners know …"* (Mary)

> *"…economic concepts like 'cost' and 'revenue' in grade 11 are common knowledge to everyone …"* (Jane)

> *"…concepts such as 'profits and losses' seem to be known by everyone. At least, everyone understands the lay-mans' view of profit…"* (Lerato)

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Teachers' Content Knowledge regarding Specialized Content Knowledge (SCK)

Teachers' responses to Content Knowledge were grouped under a category '**Teachers' specialized area in MD'** was organized into a sub-theme Specialized Content Knowledge.

In the case of teachers' Content Knowledge as related to SCK, the research proved that the participant teachers used their TS-PCK to identify some aspects of MD that required the special knowledge of an economics teacher. Participant teachers identified the most common errors learners commit on different aspect of MD and the different areas learners find challenging in MD, which a non-economist teacher may not be able to identify. For example, Mary noted that learners place the 'Price' on the 'X' axis of the graph and the 'Quantity' on the 'Y' axis of the graph. Jane explained that it takes a SCK of an economics teacher to explain why in the long run, all fixed factors of production become variables, while Lerato pointed out that it takes a specialized economics knowledge to differentiate between accounting profit which is what most people generally mean as profit and economic profit. This result implied that the participating economics teachers possess unique skills to identify what makes the topic Market Dynamics difficult to teach. Further findings indicated that the participating teachers used their TS-PCK as related to SCK to identify areas that were difficult to teach but could not give cogent reasons to explain why those areas were difficult. For example, it was difficult for Mary to explain to the learners that a change in demand is the shifting of the demand curves and a change in quantity demand is a movement of along the demand curve which is caused only by a change in price. Similar reason was given by Jane that learners for the first time have to consider how other products influence a certain compliment or substitute and therefore to explain the idea behind the concepts becomes challenging. Below are teachers' responses:

> "*...I have noticed that learners place the 'Price' on the 'X' axis of the graph and the 'Quantity' on the 'Y' axis of the graph…"*(Mary)
> "*… it takes a specialized knowledge of an experienced economics teacher to explain why in the long run, all fixed factors of production become variable…"* (Jane)
> *"...it requires the specialized knowledge of an economics teacher to differentiate between accounting profit which is what most people generally mean as profit and economic profit whereby opportunity cost are deducted from revenues earned…"*(Lerato)

Teachers' Content Knowledge was further examined and grouped under the category '**Teachers' Topic Specific knowledge of difficult areas**' which emerged under the sub-theme 'Specialized Content Knowledge'.

The result of the research revealed that the participating teachers' content knowledge as related to SCK showed that teachers used their TS-PCK to identify difficult areas that are challenging to teach in the topic of MD but find it difficult to explain to learners' understanding.

> *"...It is difficult to explain to them (learners) that a change in demand is the shifting of the demand curves and a change in quantity demanded is a movement of along the demand curve which is caused only by a change in price…"*(Mary)
> *"...for the first time, they have to consider how other products influence a certain compliment or substitute…how price change in one influence the quantity demanded or supplied of the other…"* (Jane)
> *"...explaining the short-run and long-run equilibrium output level of the industry and the firm is difficult..… explaining the graphs that show the differences between the Market (industry) and the individual firms…"* (Lerato)

Another category of Content Knowledge identified was '**Teachers' Topic Specific knowledge of reasons for difficult areas'** was classified under the sub-theme 'Specialized Content Knowledge' (SCK).

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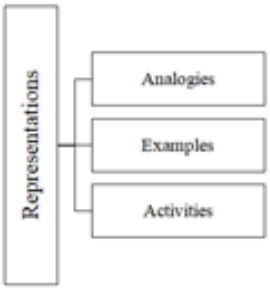
The finding from teachers' use of SCK showed that the teachers have insufficient pedagogical transformative power to transfer the content knowledge they have in MD into teachable form. One thing is to have the content knowledge, another thing is the ability to communicate the knowledge. This was evident from teachers' responses:

> *"…the breaking of the content down into smaller bits …"* (Mary)
>
> *"… it becomes difficult to explain it in different ways…"* (Jane)
>
> *"…those areas are difficult to teach because learners are confused due to different ways in which the concepts have been explained by different teachers right from grade 10…"* (Lerato)

Economics Teachers' use of TS-PCK based on Representations

Teachers' responses from the interviews have been selected and grouped into categories to form similar pattern. Teachers' TS-PCK on the use of representations is discussed under the three sub-themes that emerged: Analogies, Examples and Activities (See Figure 2).

Figure 2
The sub-themes from economics teachers' TS-PCK representations



Teachers' knowledge of Representation was categorized under **'Teachers' Topic Specific Knowledge of Analogies'** which emerged as a sub-theme 'Analogies'.

In the case of analogies, the findings of this research showed that all the teachers demonstrated adequate use of TS-PCK in the area of analogies when teaching MD. Differences in the type of analogies used by each of the participant teacher depended on the concepts being taught. Mary, the 10th grade teacher used '*sea saw'*, Jane the 11th grade teacher used '*class captain'* and '*Nike*' while Lerato equally used '*Nike*' as analogies. Jane and Lerato used the same analogy '*Nike*' for teaching different sub-topics in Market Dynamics which suggests that both taught similar concepts though in different sub-topics of MD. The teachers made the following comments:

> "*… I remember using a 'see-saw' to describe the law of demand and price equilibrium to the learners"* (Mary)
> *"I still remember when teaching relationships between markets, I used 'class captain' as an analogy to explain the concept of substitute. I have also used the Nike sign and Unilever logo to illustrate the concepts of Marginal cost and Average Total cost respectively"* (Jane)
>
> "*… for example, I remember using an analogy of 'Nike sign' for Marginal cost and 'a smiling face' for Average cost…"* (Lerato)

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Teachers' knowledge of Representation was also examined under the category **'Teachers' Topic Specific Knowledge of Examples'** which resulted into a sub-theme 'Examples'

On the use of examples, the results showed that participating teachers used their topic specific representation to illustrate concepts using authentic examples. Mary used the demand for 'winter jackets' during winter to illustrate the concept of demand and the supply of 'watermelon' during summertime to illustrate the concept of supply. Jane used vehicle and petrol as examples of complement goods and apples and grapes as examples of substitute goods while Lerato used doctors when explaining the short-run analysis and clothing, medicines when explaining imperfect Market as a monopolistic competition. In all the examples given by the teachers, Lerato examples for the grade she taught seemed to be lower than that of the other teachers. One would have expected Lerato (the 12th grade) teacher to use specific examples as supposed generic examples.

> "*... I use current events in the country or any of our daily activities and daily life examples. For instance, the demand for winter jackets during winter as the prices of jackets go up to illustrate the concept of demand and the supply of watermelon during summertime as an example to illustrate the concept of supply..... because they can easily figure it out…"* (Mary)

> *"...I have used vehicle and petrol as complement goods and apples and grapes as substitute goods…"* (Jane)

> *"...I have used doctors when explaining the short-run analysis…", I have also used…." "...I have as well used examples like clothing, medicines when explaining imperfect Market as a monopolistic competition…"* (Lerato)

Another category of Representation is **'Teachers' Topic Specific Knowledge of Activities'** which turned out to a sub-theme 'Activities'.

The result of the research on teachers' use of activities showed that all the participant teachers felt inadequate in their topic specific use of activities. The finding indicated that the participant teachers' all struggle to find activities to illustrate most of the concepts they teach. Teachers' inability to find activities is related to their responses that most of MD concepts were more of abstract in nature and therefore demanded more of theoretical mastering first before it could be related to real life activities. This finding implied that the teachers were likely to find activities to illustrate the MD concepts if the learners had mastered some abstract MD concepts. However, one expected the teachers to formulate activities on their own as in the case of the 10th grade teacher (Mary) despite the abstractness of the MD concepts. The teachers expressed their opinions as follows:

> *"... I quickly think and formulate one activity during the lesson period that can depict what I am explaining. You know, Market Dynamics concepts are a bit of abstract, but I can't remember any of those I have used now…"* (Mary)

> *"...those concepts are abstract in natur;, it is difficult to find…"* (Jane)

> *"...I rarely use activities to teach MD because of the abstract nature of most of the concepts although it depends on the concept being treated…"* (Lerato)

Although the teachers emphasized more on the abstractness of MD concepts as related to finding activities, during the interview, the teachers believed the use of activities are relevant to learners' understanding of MD because learners can easily connect it to their daily activities.

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Table 1
Summary of the results

Dependent Variables	**Independent Variables**				
Teachers' TS Knowledge connection to previous MD concepts	Mary	Jane	Lerato	Summary of Analysis	Emerging theme
	"I revisit the concepts of 'needs' and 'wants'- their differences learnt in grade 7 and the concepts of 'goods and services' knowing that these simple concepts are basic concepts to understanding the topic of MD in grade 10…"	*"I recall to their memory their grade 10 work… when teaching 'Product and Factor Market' under MD for example, I recall the circular flow which they learnt in grade 10…"*	*"…Grade 12 is all about revision of all that we have done from grade 10 to this point, so almost all the concepts in lower grades 10 and 11 are being revised in grade 12 in preparation for the June and matric exams…"*	All the teachers demonstrated evidence of TS-PCK in relation to HCK although each is different across the teachers.	Horizon Content Knowledge (HCK)
Teachers' TS knowledge of learners' understanding of common MD concepts	*"…some economics concepts that are really common knowledge like 'Price' and 'Quantity', that we assume learners know, …"*	*"…economic concepts like 'cost' and 'revenue' in grade 11 that look like common knowledge to everyone …"*	*"…concepts such as profits and loses seem to be known by everyone. At least, everyone understands the lay-mans' view of profit…"*	The three teachers demonstrated adequate use of TS-PCK as related to common content knowledge.	Common Content Knowledge (CCK)

Teachers' specialized area in MD'	*"…I have noticed that learners place the 'Price' on the 'X' axis of the graph and the 'Quantity' on the 'Y' axis of the graph…"*	*"… it takes a specialized knowledge of an experienced economics teacher to explain why in the long run, all fixed factors of production become variable."*	*"…it requires the specialized knowledge of an economics teacher to differentiate between accounting profit which is what most people generally mean as profit and economic profit whereby opportunity cost are deducted from revenues earned"*	The teachers made use of their TS-PCK in relation to their unique specialized content knowledge for teaching Market Dynamics.	Specialized Content Knowledge (SCK).
Teachers' TS knowledge of difficult areas	*"…It is difficult to explain to them (*learners*) that a change in demand is the shifting of the demand curves and a change in quantity demanded is a movement of along the demand curve which is caused only by a change in price…"*	*"…for the first time, they have to consider how other products influence a certain compliment or substitute…how price change in one influence the quantity demanded or supplied of the other…"*	*"…explaining the short-run and long-run equilibrium output level of the industry and the firm is difficult…… explaining the graphs that show the differences between the Market (industry) and the individual firms…"*	The teachers all identified areas that are difficult to teach.	Specialized Content Knowledge (SCK).
Teachers' Topic Specific knowledge of reasons for difficult areas	*"…the breaking of the content down into smaller bits …"*	*"… it becomes difficult to explain it in different ways…"*	*Those areas are difficult to teach because learners are confused due to different ways in which the concepts have been explained by different teachers right from grade 10…"*	All the teachers gave reasons why those areas are difficult to teach.	Specialized Content Knowledge

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Teachers' Topic Specific Knowledge of Analogies	*"… I remember using a 'see-saw' to describe the law of demand and price equilibrium to the learners"*	*"… when teaching relationships between markets, I used 'class captain' as analogy ....*	*"… For example, I remember using an analogy of Nike sign for Marginal cost and a smiling face for Average cost…"*	The teachers demonstrated the use of TS-PCK analogies when teaching MD.	Analogy
Teachers' Topic Specific Knowledge of Examples	"… I use current events in the country or any of our daily activities because they can easily figure it out…For instance, the demand for winter jackets during winter as the prices of jackets go up to illustrate the concept of demand and the supply of watermelon during summer time as an example to illustrate the concept of supply..... because they can easily figure it out…"	*I have also used the Nike sign and Unilever logo to illustrate…"* *"…I have used vehicle and petrol as complement goods and apples and grapes as substitute goods…"*	*"... I have used doctors when explaining the short-run analysis…" "…I have as well used examples like clothing, medicines when explaining imperfect Market as a monopolistic competition…"*	The teachers all used examples to illustrate some concepts in MD.	Examples
Teachers' Topic Specific Knowledge of Activities.	*"… I quickly think and formulate one activity during the lesson period that can depict what I am explaining. You know, Market Dynamics concepts are a bit of abstract, but I can't remember any of those I have used now…"*	*"…those concepts are abstract in nature; it is difficult to find…"*	*"…I rarely use activities to teach MD because of the abstract nature of most of the concepts although it depends on the concept being treated…"*	Teachers all struggle to find activities to illustrate MD concepts.	Activities

Discussion

Economics Teachers' Topic Specific Content Knowledge

The researchers' interest in this research relates to the lessons that can be drawn from the findings of economics teachers' use of TS-PCK in teaching MD in South Africa. The results of the research showed that economics teachers possess adequate topic specific content knowledge in different categories: Horizon Content Knowledge (HCK), Specialized Content Knowledge (SCK) and Common Content Knowledge (CCK).

With regard to HCK, the teachers demonstrated adequate use of HCK in teaching MD. Teachers all saw the need to revisit difficult MD concepts in previous grades. The reason is that the economics concepts taught in current grades are built upon from the concepts learnt from previous grades according to CAPS economics curriculum. This suggests that teachers' knowledge of learners' difficult concepts learnt from previous grades help teachers to teach MD better. The knowledge helps in clarifying learners' misconceptions that tend to create cognitive conflicts when teaching specific topics in current grade thus making that which makes the topic

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MD difficult to teach or learn becomes easier to identify. While Mary and Jane were specific in identifying difficult MD concepts, they revisited that learners find challenging in previous grades, Lerato claimed she indirectly revisited all concepts in preparation for the coming exams. This finding may not be surprised as it seems Lerato was more concerned about preparing learners for the final exit exams hence, was not concerned about specific concepts that needed to be revisited or that are challenging to the learners in previous grades. This finding echoed Bowie et al., (2019) finding in South Africa that pre-service teachers need to revisit primary school mathematics in order to gain deep understanding of key mathematical concepts for future teaching. Ayers (2016) also found that the participated economics teachers in the study demonstrated Horizon content knowledge by making curriculum connections of economic content in the topic that they were currently teaching from previous grades. The finding is also in consonance with Bello et al., (2018) who found that students' learning difficulties in Physics concepts learnt in previous grades were the major reasons for lack of understanding of some Physics topics.

Concerning teachers' use of TS-PCK as related to CCK, the findings indicated that participating teachers identified common concepts that learners ought to have knowledge about. The finding revealed teachers' ability to envisage MD concepts learners find interesting or challenging. In essence, the research finding showed that the participating teachers possessed adequate CCK. This finding implied that the teachers possessed general knowledge of common learners' conceptions and misconceptions of basic economics terminologies and economics concepts. This suggests that the participating teachers had the ability to recognize the common concepts they believed to be of common knowledge to learners as learners incorrectly used them. Teachers believe learners ought to have general knowledge of these concepts but may not have accurate economics knowledge of the concepts. The possible reason teachers may assume these concepts are 'common' could be teachers' familiarity with the concepts learners seem not to struggle much about. However, these concepts may not be as 'common' *per se* as they appear because there are underlying economics meanings attached to them. For effective teaching to take place, teachers need profound understanding of the common content knowledge. The finding of this research is similar to Briand-Newman et al., (2012) whose practicing teachers in their study identified CCK and noted that the starting point for identifying common content knowledge for teaching Kindergarten kids was the K-6 Mathematics Syllabus. However, it is contrary to the finding of Bansilal et al., (2014) who explored teachers' common content knowledge of some concepts in calculus and linear programming and found that practicing teachers struggled with the mathematics common content that they were teaching. Although research on teachers' pedagogical content knowledge indicates that there is much more than just knowing the common content knowledge (Shulman, 1986; Ball, Thames, & Phelps, 2008), it is important that teachers should have understanding of basic common concepts of MD.

Another finding from this research showed that the participating economics teachers used their TS-PCK as related SCK to identify what makes a topic difficult to teach. They did this by identifying some aspects of MD that require only specific knowledge of an economics teacher. The reason teachers were able to use their SCK to identify difficult and challenging aspect of MD that requires specialized economics teachers' knowledge could be attributed to teachers' years of teaching experience. Having taught the topic for a good number of years, teachers tend to master the aspects that require specific knowledge of the teacher. The finding suggests that the participating teachers possess unique SCK skill for unpacking the content of the topic MD during classroom teaching thus, this knowledge helps the teachers to understand the most common errors learners are likely to commit. The findings of this research support the findings of Chinnappan and White (2015) that examined the SCK of pre-service teachers on evaluation of the plausibility of students' claims and errors and found that the teachers had developed a sense of student error but experienced difficulty in explaining the source of these

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errors. The study by Ding and Heffernanb (2018) in USA revealed the pre-service teachers' successes and challenges in unpacking an example task through a transfer of intended SCK to elementary classrooms. Their finding is similar to the findings in this research that economics teachers were able to understand what makes a topic difficult to teach by unpacking the areas that required teachers' unique knowledge of MD thus making use of their SCK.

Further finding of the research as related teachers' SCK revealed that teachers used their TS-PCK to identify difficult areas that are challenging to teach in the topic of MD but find it difficult to explain to learners' understanding. For example, Mary found it difficult to explain to the learners that a change in demand is the shifting of the demand curves and a change in quantity demanded is a movement of along the demand curve. The reason for this could be that learners tend to interchange and confuse the concepts of 'shift' and 'movement' often used in explaining this idea. Likewise, Jane and Lerato identified challenging areas to teach but found it difficult to explain to the learners. The finding may suggest more professional development on the teachers' use of topic specific knowledge in some aspect of MD despite many years of teaching. Similar result was found by Chinnappan and White (2015) that the participants in the group identified the source of student error but found it difficult to explain the source of the errors.

The teachers also used their TS-PCK as related to SCK to understand what makes those areas of MD difficult to teach but lack pedagogical transformative power to transfer the content knowledge to the teachable form. One would have expected that with the teaching experience, Mary and Jane would not have the challenge of knowledge transfer in the topic of MD, but it is not so. This suggests that not all aspects of MD are easy to teach despite years of teaching experience and the specialized knowledge one might have acquired in a specific topic. The finding concurs with Rice and Kitchel (2016) who found that beginning teachers' content knowledge greatly influenced the breaking down of content knowledge for learners' understanding. Borghi et al. (2017) argue that the best approach to represent difficult concepts is by multiple representation views which are a combination of embodied perspective with the recognition of the importance of linguistic and social experience. Chavan (2016) result also concurs with our findings that teachers face difficulties in comprehension of difficult concepts thus making it difficult to explain in different ways. One would have assumed in the case of Lerato that different representations and explanations of a concept should provide opportunities for learners to understand the concept more easily. However, Ornek et al., (2008) were of the same opinion that learners' difficulties stem from the way the concepts are taught and the nature of problems which are sometimes very ambiguous.

Regarding the use of analogies, the findings indicated that all the teachers purposefully used good analogies to explain most concepts. This finding might be quite surprising considering the abstract nature of MD concepts claimed by the teachers. However, the research result proved that it does not necessarily have to be so because participant teachers relate MD concepts to other subjects in different domains as such, it might be easier to find concept similarities from other subjects. We agree with the findings of Jonane (2015) that majority of the teachers in the research believe that purposeful use of analogy is a good method for teaching abstract science topics. The finding of the research is also similar to the findings by Burdina and Sauer (2015) who used analogies to teach economic principles and found that the use of analogies helped to promote learning.

As related to the use of examples, the research finding showed that all the teachers used variety of examples to explain MD concepts although examples used by each of the teacher is of different degree with respect to the grade level taught. Mary for example used authentic examples required for the 10th grade to illustrate the difficult MD concepts. The findings suggest Marys' ability to promote conceptual understanding of difficult MD concepts. The findings also proved Marys' explanatory power to connect content knowledge to pedagogical knowledge.

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Mary used good example to enhance learners' understanding of the concepts that would have appeared highly abstract to the learners hence making it easier for the learners to understand. Jane also used examples, but the examples used by Jane appeared to be too classical and difficult for the learners at the grade level taught. Jane ought to have used example closed to the learners' experiences. This finding may be attributed to the higher qualification (Master of Science degree in economics) obtained by Jane that makes it challenging to use simple examples that are equivalent to the learners' level of understanding. It seems to suggest that the higher the educational qualification, the more difficult it becomes to teach secondary school level topics. This interpretation is subject to further research. However, the finding concurs with the findings of Ng and Dindyal (2015) who found that students experience difficulties with the use of examples when it is used to introduce mathematical ideas. On the other hand, Leratos' examples seem generic and not specific. One expected Lerato to use example such as 'Eskom' as a specific example of an imperfect monopolistic competition than the clothing and medicines that were used. Selecting examples should not be merely choosing examples, good examples and the clarity of examples are necessary for quick understanding. Even on the second example, Lerato overlooked a crucial economic process, that of ceteris paribus assumptions and factors that affect supply in the analysis of supply; that supply of doctors in the short-run analysis may depend on government policies to employ foreign doctors. This finding is in line with Suffiana and Rahmanb (2010) who found the need for teachers to consider carefully and raise awareness when choosing and using examples. The findings by Alkan et al., (2017) that teachers use generic examples and non-examples in their lessons is also parallel to our finding in the case of Lerato.

The findings proved that all the teachers were unable to provide specific activities to illustrate some of the concepts in MD rather; the teachers claimed that MD concepts are abstract in nature and as a result could not find appropriate activities to represent them. This result is consistent with the findings by Sanders et al., (1993) who established that teachers struggled to get hold of the appropriate representations such as activities to facilitate learners' understanding. The finding also supports the research by Samperio (2017) who found that teachers used less listening activities as supposed students' preferences to the use of activities. Contrary to these findings, other research findings in the literatures show that the use of activity as a learning approach makes teaching and learning fun, meaningful and improves learning. For example, Anwer (2019) found that majority of the students found the teaching based on activity more interesting than teaching based on the lecture. In one study, Coşkun, and Eker (2018) used activity to teach English and found statistically significant difference on the level of academic success. In another study, Rubin et al., (2014) used different activities to teach a specific topic of integers and found that the use of activities increased students' learning and their conceptual understanding on the topic. We can conclude from these results on teachers' use of activities that although economics teachers in this research possess a certain level of teaching experience, it appears that they need more teacher development training on the aspect of the use of activities to improve their TS-PCK knowledge of representations.

The results of this research point to the need for teacher education program in South Africa to integrate the use of TS-PCK as one of the instructional practices to improve the teaching of MD and other specific economics topics. Teachers need to be given challenging topics, to help them interrogate their understanding of these fundamental economics concepts that they are teaching and to understand how their topic specific knowledge informs their teaching. This is in line with Kilic's (2011) finding that suggested that teacher education programs need to offer courses that provide in-service teachers with opportunities to review fundamental topics taught in secondary school.

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Conclusions

The findings showed that all the teachers showed adequate content knowledge as related to the use of Horizon Content Knowledge, Specialized Content Knowledge and Common Content Knowledge in teaching MD. These categories of content knowledge domain help the teachers to teach MD better to learners' understanding. The finding also indicated that all the teachers were able to use analogies and examples as topic specific ways of representations but expressed common opinion that MD concepts are abstract in nature thus finding activities to illustrate them proved challenging.

As indicated at the research problem, that there is little evidence in South Africa to show that much progress has been made at learners' understanding of the topic Market Dynamics in our secondary schools. This research closed this gap by capturing and documenting economics teachers' use of TS-PCK in South Africa. There is a global concern that learners find MD concepts dry, challenging and abstract in nature because MD concepts are predominantly taught in concept specific forms. This research closed the gap by looking at the teaching and learning of MD in its topic using TS-PCK in teaching MD which is believed to help enhance learners' understanding of the topic. Lastly, this research has added to economics education literature research on the use of TS-PCK in teaching the specific topic 'Market Dynamics', and to one aspect of teachers' knowledge; topic specific knowledge for teaching specific topics in economics, a missing aspect in economic education literature. This research raises a concern about whether it is possible for teacher education programs to help economics teachers improve the teaching of Market Dynamics using TS-PCK. The assumption in this research is that economics teachers have developed an understanding of the school economics content they need, hence understanding the use of topic specific Pedagogical knowledge base cannot form the focus of their instruction at the secondary school. Based on this reality, it is important that teachers should model the use of TS-PCK in teaching MD to support both prospective and inexperienced economics teachers.

Further studies should extend the research to other provinces in South Africa and in particular to private schools in other provinces. It is also recommended that a longitudinal study similar to this be conducted to specific group of learners by a specific teacher from grade 10 to grade 12 since the study is all about specifics. Another aspect worth analyzing is economics teachers' use of other Topic Specific PCK component; teaching strategies, learner prior knowledge, and curricular saliency in teaching not only Market Dynamics but other economics specific topics.

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References

Akinyemi, O. S. (2016). *Pre-service teachers' development of topic specific pck in kinematics and transferability of PCK competence to a new physics topic*. [Masters dissertation, University of the Witwatersrand, Johannesburg, South Africa]

Alkan, S., Güven, B., & Yılmaz, S. (2017). The types of examples teachers use in teaching function concept. *Bayburt Eğitim Fakültesi Dergisi*, *12*(23), 367-384.

Anwer, F. (2019). Activity-based teaching, student motivation and academic achievement. *Journal of Education and Educational Development*, *6*(1), 154-170. https://doi.org/10.22555/joeed.v6i1.1782

Ayers, C. A. (2015). A *qualitative study of the pedagogical content knowledge and personal orientations toward economics of award-winning secondary economics teachers*. [Unpublished Doctoral Dissertation]. The University of North Carolina- Greensboro.

Ayers, C. A. (2016). Developing pre-service and in-service teachers' pedagogical content knowledge. *Social Studies Research and Practice, 11*(1), 73-92. https//www.socstrp.org

Ayers, C. A. (2018). A first step toward a practice-based theory of pedagogical content knowledge in secondary economics. *The Journal of Social Studies Research, 42*(I), 61-79. https://doi.org/10.1016/jssr.2017.01.003

Azam, S. (2019). Distinguishing topic-specific professional knowledge from topic-specific pck: A conceptual framework. *International Journal of Environmental and Science Education, 14*(5), 281-296.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education, 59*(5), 389-407. https://doi.org/10.1177/0022487108324554

Bal, A. P. (2014). The examination of representations used by classroom teacher candidates in solving mathematical problems. *Educational Sciences: Theory & Practice, 14*(6), 2349-2365. https://doi.org/10.12738/estp.2014.6

Bansilal, S., Brijlall D., & Mkhwanazi, T. (2014). An exploration of the common content knowledge of high school math teachers. *Perspectives in Education, 32*(1), 34-50. http://hdl.handle.net/10321/2306

Bello, T. O., Opaleye, O. S., & Olatunde, A. N. (2018). Perceived difficult concepts in physics among senior secondary school students in Ife central local government area of Osun state. *International Journal of Contemporary Issues in Education, 3*, 30-41.

Briand-Newman, H., Wong, M., & Evans, D. (2012). Teacher subject matter knowledge of number sense. In J. Dindyal, L. P. Cheng & S. F. Ng (Eds.), *Mathematics education: Expanding horizons* (Proceedings of the 35th annual conference of the Mathematics Education Research Group of Australasia). MERGA. © Mathematics Education Research Group of Australasia.

Borghi, A. M., Binkofski, F., Castelfranchi, C., Cimatti, F., Scorolli, C., & Tummolini, L. (2017). The challenge of abstract concepts. *Psychological Bulletin*. *Advance Online Publication*. https://dx.doi.org/10.1037/bul0000089

Bowie, L., Venkat, H., & Askew, M. (2019). Pre-service primary teachers' mathematical content knowledge: an exploratory study. *African Journal of Research in Mathematics, Science and Technology Education, 23*(3), 286-297. https://dx.doi.org/10.1080/18117295.2019.1682777

Burdina, M., & Sauer, K. M. (2015). Teaching economic principles with analogies. *Review of Economics Education*, *(20)*, 29–36. https://dx.doi.org/10.1016/j.iree.2015.10.001

Çelik, H. C. (2018). The effects of activity based learning on sixth grade students' achievement and attitudes towards mathematics activities. *EURASIA. Journal of Mathematics, Science and Technology Education. 14*(5), 1963-1977. https://dx.doi.org/10.29333/ejmste/85807

Chavan, R. (2016). Difficulties in teaching biology concepts by science teachers at upper primary level. *Aayushi International Interdisciplinary Research Journal*, *3*(8), 10-18. https://www.researchgate.net/publication/306400265_Difficulties_In_Teaching_Biology_Concepts_By_Science_Teachers_At_Upper_Primary_Level

Chinnappan, M., & White, B. (2015). Specialized content knowledge: Evidence of pre-service teachers' appraisal of student errors in proportional reasoning. In M. Marshman, V. Geiger, & A. Bennison (Eds.), *Mathematics education in the margins*: Proceedings of the 38th annual conference of the Mathematics Education Research Group of Australasia. (pp. 157–164). MERGA.

Coşkun, İ., & Eker, C. (2018). The effect of teaching activities done by using activity based posters on the students' academic achievements, retention levels in their learning. *Universal Journal of Educational Research,* 6(4), 585-597. https://dx.doi.org/10.13189/ujer.2018.060402

Creswell, J. W., Ebersohn, L., Eloff, I., Ferreira, R., Ivankova, N. V., Jansen, J.D., Nieuwenhuis, J., Pietersen, J., & Plano Clack, V.L. (2016). *First Step in Research 2.* Second Edition. Van Schaik Publishers.

Department of Basic Education (2011). *National curriculum statement. Grades 10- 12 (Economics).* Pretoria: National Department of Education.

Ding, M., & Heffernanb, K. (2018). Transferring specialized content knowledge to elementary classrooms: Preservice teachers' learning to teach the associative property. *International Journal of Mathematical Education in Science and Technology*, *49*(6), 899–1921. http://dx.doi.org/10.1080/0020739X.2018.1426793

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Fourie, A., & Krugell, W. (2015). Determining the economic literacy of introductory economic students in South Africa. *International Journal of Economic Education and Development, 6*(1), 86-96.

Gökbulut, Y., & Ubuz, B. (2013). Prospective primary teachers' knowledge on prism: Generating definitions and examples. *Elementary Education Online*, *12*(2), 401-412. http://ilkogretim-online.org.tr

Hansen, W. L. (1984). Teaching the concept of demand: Another approach. *The Journal of Economics Education*, *15*(2), 148-156. http://dx.doi.org/ www.jstor.org/stable/1182055

Hsieh, H., & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(12), 77-88.

Hurrell, D. P. (2013). What teachers need to know to teach mathematics: An argument for a reconceptualised model. *Australian Journal of Teacher Education*, *38*(11), 53-64. http://dx.doi.org/10.14221/ajte.2013v38n11.3

Jonane, L. (2015). Using analogies in teaching physics: A study on Latvian teachers' views and experience. *Journal of Teacher Education for Sustainability, 17*(2), 53-73. http://dx.doi.org/10.1515/jtes-2015-0011

Kilic, H. (2011). Preservice secondary mathematics teachers' knowledge of students. *Turkish Online Journal of Qualitative Inquiry, 2*(2), 17-35.

Kruger, D. (2018). Teacher educators' perspectives on pedagogical content knowledge for secondary school economics teaching. [Masters Dissertation: North-West University, South Africa].

Korstjens, I., & Moser, A. (2018). Series: practical guidance to qualitative research. part 4. trustworthiness and publishing. *European Journal of General Practice, 24*(1), 120-124. http://dx.doi.org/10.1080/13814788.2017.1375092

Kuhn, C., Alonzo, A., & Zlatkin-Troitschanskaia, O. (2016). Evaluating the pedagogical content knowledge of pre-and in-service teachers of business and economics to ensure quality of classroom practice in vocational education and training. *Empirical Research in Vocational Education and Training, 8*(5), 1-18.

Kuhn, C., Zlatkin-Troitschanskaia, Anke, L., Colin, J., Hannes, S., & Heinze, A. (2020). Relationships between domain-specific knowledge, generic attributes, and instructional skills: Results from a comparative study with pre- and in-service teachers of mathematics and economics. In Zlatkin-Troitschanskaia, O., Pant, H., Toepper, M., Lautenbach, C. (Eds), *Student learning in German higher education* (pp. 75-103). Springer VS, Wiesbaden. http://dx.doi.org/10.1007/978-3-658-27886-1_5

Kumar, S. S., & Rajaraman, H. (2018). The use of analogies in teaching lexis. *The English Classroom, 20*(1), 31-40.

Loughran, J., Berry, A., & Mulhall, P. (2006). *Understanding and developing science teachers' pedagogical content knowledge.* Sense.

Loughran, J. (2019). Pedagogical reasoning: The foundation of the professional knowledge of teaching, teachers and teaching. *Teachers and Teaching Theory and Practice, 25*(5), 523-535. http://dx.doi.org/10.1080/13540602.2019.1633294

Mankiw, N. G. (2015). *Principles of macro economics 7E*. Mason, OH: Cengage Learning.

Mavhunga, E., & Rollnick, M. (2013). Improving PCK of chemical equilibrium in pre-service teachers. *African Journal of Research in Mathematics, Science and Technology Education, 17*(1-2), 113-125. https://dx.doi.org/10.1080/10288457.2013.828406

Mavhunga, E., & Rollnick, M. (2016). Can the principles of topic specific PCK be applied across science topics? Teaching PCK in a pre-service programme. In N. Papadouris, A. Hadjigeorgiou, & C. P. Constantinou (Eds), *Insights from research in science teaching and learning: Book of Selected Papers from the ESERA 2013 Conference* (pp. 56-72). Springer.

Mavhunga, E., Ibrahim, B., Qhobela, M., & Rollnick, M. (2016). Student teachers' competence to transfer strategies for developing PCK for electric circuit to another physical sciences topic. *African Journal of Research in Mathematics, Science and Technology Education, 20*(3), 299-313. https://dx.doi.org/10.1080/18117295.2016.1237000

Mavhunga, M. E. (2012). *Explicit inclusion of topic specific knowledge for teaching and the development of pck in pre-service science teachers.* [Doctoral thesis, University of the Witwatersrand, Johannesburg, South Africa].

Méndez-Carbajoa, D., & Asartab, C. J. (2017). Using fred data to teach price elasticity of demand. *The Journal of Economic Education*, *48*(3), 176-185. https://dx.doi.org/10.1080/00220485.2017.1320607

Mphathiwa, L. (2015). *An investigation into the topic specific pedagogical content knowledge of Botswana social studies teachers: The case of 'water resources and their management*'. [Doctoral thesis, University of the Witwatersrand. Johannesburg, South Africa].

Ng, L. K., & Dindyal, J. (2015). Examples in the teaching of mathematics: Teachers' perceptions. In M. Marshman, V. Geiger, & A. Bennison (Eds.), *Mathematics education in the margins (Proceedings of the 38th annual conference of the Mathematics Education Research Group of Australasia*) (pp. 461–468). MERGA. http://hdl.handle.net/10497/17805

Ng, S. F., & Chan, O.K.K. (2014). A preliminary study on the development of pedagogical content knowledge among economics and primary social studies student teachers in Singapore. *HSSE Online*, *3*(1), 25-36.

Nind, M. (2019). A new application for the concept of pedagogical content knowledge: Teaching advanced social science research methods. *Oxford Review of Education*, *46*(2), 181-201. https://dx.doi.org/10.1080/03054985.2019.1644996

Onwioduokit, F. A. (1996). Perceived difficult concepts in physics as experienced by senior secondary students in Akwa Ibom state Nigeria. *The Researcher, Journal of Nigerian Education Research Reporters' Association, 1*(1), 19-28.

Ornek, F., Robinson, W. R., & Haugan, M. P. (2008). What makes physics difficult? *International Journal of Environmental and Science Education*, *3*(1), 30-34.

Phelps, G., Weren, B., Croft, A., & Gitomer, D. (2014). *Developing content knowledge for teaching assessments for the measures of effective teaching study*. ETS Research Report (14-33). Educational Testing Service. https://dx.doi.org/10.1002/ets2.12031

Rice, A. H., & Kitchel, T. (2016). Influence of knowledge of content and students on beginning agriculture teachers' approaches to teaching content. *Journal of Agricultural Education, 57*(4), 86-100. https://dx.doi.org/10.5032/jae.2016.04086

Rollnick M., & Mavhunga, E. (2016). Can the principles of topic-specific PCK be applied across science topics? Teaching PCK in a pre-service programme. In: Papadouris N., Hadjigeorgiou A., Constantinou C. (Eds), *Insights from research in science teaching and learning. Contributions from science education research*, *2*. (pp. 59-72). Springer.

Rollnick M., & Mavhunga, E. (2017) Pedagogical content knowledge. In: Taber, K.S., Akpan, B. (Eds.), *Science education*. *New directions in mathematics and science education* (pp. 507-522. SensePublishers. https://doi.org/10.1007/978-94-6300-749-8_37

Rollnick, M., Davidowitz, B., & Potgieter, M. (2017). Is topic-specific pck unique to teachers? In: Hahl K., Juuti K., Lampiselkä J., Uitto A., Lavonen J. (Eds.), *Cognitive and affective aspects in science education research. Contributions from science education research*, *3*. (pp. 69-89) Springer. https://doi.org/10.1007/978-3-319-58685-4_6

Rubin, R. J., Marcelino, J., Mortel, R., & Lapinid, M. R. C. (2014). Activity-based teaching of integer concepts and its operations. Presented at the DLSU Research Congress. De La Salle University, Manila, Philippines.

Rupp, N. G. (2010). A classroom experiment illustrating the law of demand. Department of economics. A-437 Brewster Building East Carolina University Greenville, NC 27858-4353.

Samperio, N. (2017). Discovering students' preference for classroom activities and teachers' activity use. *Colombian Applied Linguistic Journal, 19*(1), 51-66. https://dx.doi.org/10.14483/calj.v19n1.9292

Sanders, L. R, Borko, H. & Lockard, J. D. (1993). Secondary science teachers' knowledge base when teaching science courses in and out of their area of certification. *Journal of Research in Science Teaching 30*(7), 723 – 736. https://dx.doi.org/10.1002/tea.3660300710

Sauro, J. (2015). Five types of qualitative methods. Denver, Colorado. https://measuringu.com/qual-methods/

Schug, M. C., Harrison, A.S., Clark, J. J. (2012). All we know that may be so in economic education. *Social Studies Research and Practice, 7* (1), 1-8.

Shulman, L. (1987). Knowledge and teaching: foundations of the new reform. *Harvard Educational Review, 57*(1), 1-22. https://dx.doi.org/10.17763/haer.57.1.j463w79r56455411

Shulman, L. (1986). Those who understand; knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14. http://links.jstor.org/sici?sici=0013-1

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Suffiana, H. B., & Rahmanb, S. B. A. (2010). Teachers' choice and use of examples in the teaching and learning of mathematics in primary school and their relations to teacher's pedagogical content knowledge (PCK). International conference on mathematics education research. (ICMER). *Procedia Social and Behavioral Sciences, (8)*, 312–316. https://dx.doi.org/10.1016/j.sbspro.2010.12.043

Veal, W. R., & MaKinster, J. G. (1999). Pedagogical content knowledge taxonomies. *Electronic Journal of Science Education, 3*(4), *Article Two.* http://unr.edu/homepage/crowther/ejse/vealmak.htm

Walstad, W., & Watts, M. (2015). Perspectives on economics in the school curriculum coursework, content, and research. *The Journal of Economic Education*, *46*(3), 324-339. https://dx.doi.org/10.1080/00220485.2015.1040185

Ward, G. (2013). Examining primary schools' physical education coordinators' pedagogical content knowledge of games: Are we just playing as this? *International Journal of Primary, Elementary and Early Years' Education, 41*(6), 562-585. https://dx.doi.org/10.1080/03004279.2011.595424

Appendix 1

Interview Protocol Form

Section 1: Biographical Details.

(1) Who are you?

(2) How old are you?

Any other thing you wish to tell me about yourself?

(3) Why did you choose teaching as a career?

(4) How long have you been teaching?

(5) Tell me about your educational background; qualifications, institutions attended etc

(6) What are the pedagogical courses you took in your tertiary institution?

(7) What are your major sources of knowledge for the topic MD?

(8) Is there any correlation between the MD topic you learnt in the tertiary institution and what you teach now in the secondary school?

(9) What is your belief about the topic Market Dynamics?

(10) How confident are you in teaching MD in secondary school?

Section 2: Topic Specific Pedagogical Content Knowledge

(1) "Which concept/s from the lower grades' curriculum do you revisit (Horizon Knowledge) before teaching Market Dynamics?

(2) "Which concept/s on the topic 'MD' do you think is a common knowledge that learners ought to have knowledge of?

(3) Which aspect of MD do you think requires a specialized content knowledge of an economics teacher in understanding the most common errors learners commit?

(4) What areas are difficult to teach on the topic MD?

(5) what makes those areas on the topic of MD difficult to teach?

(6) What kind of analogies do you use when teaching any of the concepts of MD?

(7) What kind of examples do you use when teaching any of the concepts of MD?

(8) What kind of activities do you use when teaching any of the concepts of MD?

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Ijeoma Chidinma Ogbonnaya *(Corresponding author)*	PhD scholar, Tshwane University of Technology, Private Bag X680, Pretoria, 0001, South Africa. South Africa. E-mail: ijey5000@yahoo.com
Andile Mji	PhD, Professor, Assistant Dean, Postgraduate Studies, Research & Innovation. Faculty of Humanities, Tshwane University of Technology, South Africa. E-mail: mjia@tut.ac.za
Oliva Neo Mafa-Theledi	PhD, Lecturer, Department Maths Science and Business Education, Tshwane University of Technology, South Africa. E-mail: lebelooa@tut.ac.za
Beatrice Ngulube	PhD, Lecturer, Department of Educational Studies, Tshwane University of Technology, South Africa. E-mail: ngulubeb@tut.ac.za