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Approaches to ICT-enhanced teaching in technical and vocational education: a phenomenographic perspective

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Abstract This paper presents the results of a study undertaken from a phenomenographic perspective, which examines teachers' approaches to information communication technology (ICT)-enhanced teaching in vocational tertiary education. Twenty-three teachers from three Australian Technical and Further Education (TAFE) institutions participated in semi-structured in-depth interviews about their ways of experiencing the use of ICT in various vocational courses. The findings revealed two strategies with five main orientations to ICT-enhanced teaching distributed along a continuum from teacher-focused approaches: comprising information-oriented, feedback-oriented and practice-oriented to student-focused approaches: consisting of activity-oriented and industry-oriented teaching. The identified strategies and orientations extend the frameworks of teachers' approaches to ICT-enhanced teaching revealed in the previous phenomenographic studies in tertiary education. The paper discusses theoretical and practical implications of these findings for TAFE sector and tertiary education in general.

Keywords Approaches to teaching · ICT-enhanced teaching · Tertiary education · TAFE teaching · Phenomenography

Introduction

Different teachers use different teaching approaches, even if they teach similar courses, and their approaches affect students' learning (Norton et al. 2005; Prosser and Trigwell 1999). Most importantly, research shows that teachers' teaching approaches are linked with

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students' learning approaches and they impact students' learning outcomes (Trigwell et al. 1999). Thus, understanding of teachers' teaching approaches provides a means for changing their practices and, consequently, creating better learning opportunities for students. Further, there is a growing demand for incorporating information and communications technologies (ICT) in the mainstream teaching in vocational education (Bliuc et al. 2012; Khan 2015). As a result, teachers are facing increased pressures not only to have in-depth subject and general pedagogical knowledge, but also to use ICT in their teaching effectively. While there is a strong expectation that ICT could have positive effects on teaching and learning, evidence shows that this has not always been the case (Tamim et al. 2011). Therefore, empirical research that could support vocational teachers in finding out effective ways to improve their ICT-enhanced teaching practices is urgent. Despite this importance, there is a lack of knowledge about teaching approaches in vocational courses, particularly about teaching approaches with ICT. In order to fill this gap, the aim of this study is to investigate qualitative differences in how teachers in vocational education approach ICT-enhanced teaching. It asks the following research question:

How do TAFE teachers approach teaching with ICT in vocational courses?

In this study, we explored teaching across diverse specialties and subjects when ICT is used in either face-to-face classes, or blended learning, or purely online teaching, in Australian Technical and Further Education (TAFE). Our purpose is to expand current studies on ICT-enhanced teaching in tertiary education that were mainly conducted in university context to professional teaching in vocational context. For this reason, we adopted a phenomenographic research perspective that has been commonly used for investigating teaching approaches in higher education and investigated various professional subjects in TAFE sector.

Approaches to teaching in tertiary education

The term "approaches" generally refers to how people go on to do something (Marton and Booth 1997). Applying this term to education, Postareff and Lindblom-Ylänne (2008) define approaches as the strategies that teachers adopt for their teaching. Nevertheless, approaches are more than techniques: they encompass general strategic choices and associated intentions in using these strategies (Trigwell et al. 1994).

In this study, "ICT-enhanced teaching" refers to teaching where teachers use different types of technologies in teaching and learning process. These technologies could be used in face-to-face classrooms, blended teaching and learning, which combines face-to-face and online modes, or purely online teaching and learning. The term "ICT-enhanced teaching approaches" refers to how teachers accomplish their teaching when ICT is used, including their intentions and strategies that characterise their teaching practices with ICT.

Research on teachers' approaches to teaching in tertiary education includes two broad areas: (1) approaches to teaching in face-to-face contexts, and (2) approaches to teaching in blended and online contexts.

Approaches to teaching in face-to-face contexts

Prior literature on teaching face-to-face generally reported that teachers' approaches broadly range from *content-oriented/teacher-focused* (COTF) to *learning-oriented/student-*

focused (LOSF) (González 2012; Kember and Kwan 2000; Trigwell et al. 1994). COTF approaches to teaching are those where the main emphasis is on conveying information to students. Students' prior knowledge is not considered to be important, and teachers play the central role in leading teaching and learning process. Students have only a peripheral role and do not need to be proactive, driving their learning. LOSF approaches to teaching are those where the main focus is on expanding students' understanding. The primary role of teachers is to structure and facilitate the teaching and learning process, but students have responsibility for driving their learning and actively engage with knowledge.

Many studies investigated approaches to teaching as one construct. In contrast, Trigwell et al. (1994) claimed that in order to improve teaching practices, not only how teachers approach teaching (i.e. strategy), but also why teachers approach in this way (i.e. intention) need to be understood, because both aspects influence teaching. They proposed to investigate approaches to teaching by looking at the *intention* and *strategy* components and establishing relationships between them.

Only few studies described teachers' approaches to face-to-face teaching in terms of strategies and intentions (González 2012; Prosser et al. 2005; Trigwell et al. 1994). They typically categorised strategies into two broad areas: *student-focused* and *teacher-focused*, which mirror the general COTF and LOTF approaches described above. In relation to teachers' intentions, Trigwell et al. (1994) identified four common views: information transmission, concept acquisition, conceptual development and conceptual change. They found the same intentions across several studies conducted over a period of time (Prosser et al. 2005). In contrast, González (2012) identified three intentions: providing knowledge of the discipline, developing students' understanding and developing students' critical thinking worldview. While the first two intentions focus on students' learning of disciplinary knowledge and broadly echo Trigwell et al. (1994)'s findings, the last intention has a broader objective and focuses on students' capacities to think. Overall, these findings show that teaching intentions tend to vary and newer studies could bring other facets that were not identified in the previous research.

Approaches to teaching in online and blended contexts

Prior literature on approaches to teaching in online learning context and blended context, which combine face-to-face and online learning modes, extended COTF and LOSF teaching approaches to ICT-enhanced contexts. Ellis et al. (2009) conducted a study that focused on approaches to teaching in face-to-face and online context and placed all approaches into two broad categories. First, *technology-focused* approach views ICT as media for delivering information and managing teaching activities. In this approach, students are generally seen as recipients of information. Second, *student-focused* approach views ICT as media to engage students in knowledge building. In this approach, teachers aim to provide students with a space in which they engage in online discussions, exchange ideas and develop authentic understanding of the subject.

In contrast, Gonzalez (2009) studied teachers' approaches to online teaching in postgraduate online courses and identified two broad approaches: *informative-individual learning focused* and *communicative-networked learning focused*. Gonzalez (2009) argued that teaching online is rather different from teaching face-to-face, and these approaches do not fit traditional COTF and LOSF framework. This claim is in contrast to Ellis et al. (2009)'s view who argued that COTF and LOSF framework likely to fit the blended teaching context. However, these two studies investigated approaches to teaching as one construct without looking at its components (intention and strategy).

The review of prior literature shows that at the time of this study, only two research articles addressed approaches to online or blended teaching and were at least partly based on the aforementioned intention and strategy framework (Bliuc et al. 2012; González 2012).

González (2012) extended his previous study (Gonzalez 2009) and investigated university teachers' approaches to e-teaching, which he defined as "teaching using the web" (p. 978), by exploring their strategies and intentions. He identified the following three strategies: *information-focused strategy*, where the main focus is to provide information and subject content through the Web; *communication-focused strategy*, where the main focus implies communication, including discussions for enhancing students' deep thinking; and *collaboration-focused strategy*, where the main emphasis is on creating a space for students' collaboration and knowledge building. These strategies were associated with five intentions: (1) provide easy access to course materials and administrative information; (2) provide access to up-to-date/quality materials; (3) provide a space for asking questions, making announcements, keeping in touch; (4) engage students in deep thinking; and (5) provide a space for building knowledge. González (2012) noted that these findings were consistent with his earlier findings (Gonzalez 2009), with the exception of the additional collaboration-focused strategy. However, it is worth noting that his identified distinctions between the information-focused strategy and collaboration-focused strategy were broadly consistent with the COTF and LOSF framework.

Most studies on teachers' approaches to blended and online teaching have been conducted in university context. An exception is Bliuc et al. (2012)'s phenomenographic study that investigated TAFE teachers' approaches to blended teaching. Using a survey questionnaire, they identified five approaches to teaching: (1) provide detailed and accurate materials; (2) make students' practical needs easier and more convenient; (3) ensure appropriate levels of computer literacy to enhance contact between students and the teacher and promote the psychological well-being; (4) use affordances of the blended context to better meet learning needs; and (5) improve the quality of student learning and develop complex skills. These approaches broadly supported COTF and LOSF framework. While Bliuc et al. (2012) presented teachers' intentions, they did not report teachers' strategies.

Overall, this review of the literature on teachers' approaches to teaching in tertiary education has shown that there is certainly scope for new research into approaches to teaching. Research on teaching approaches in vocational context is particularly limited; there have not been interview-based phenomenographic studies; and none of the studies investigated relationships between vocational teachers' strategies and their intentions. Thus, this study attempts to fill this gap by investigating teachers' approaches to ICT-enhanced teaching in TAFE. To better understand teachers' approaches, it investigates both intention and strategy components.

Phenomenographic perspective

This research draws on a phenomenographic perspective (Marton 1981; Marton and Booth 1997). This perspective is used as both: (1) a theoretical basis for the conceptualisation of the phenomenon studied in this research, and (2) a methodological basis for the design of empirical study.

Phenomenography often depicts how people understand, distinguish, recognise, conceive or experience different aspects of the world around them (Marton and Pong 2005). This perspective assumes that people experience or conceive particular events, such as

students' learning and teachers' teaching in face-to-face or blended contexts, in a limited number of qualitatively different ways which are logically interconnected (Marton 1981). In order to understand people's experiences, phenomenographic studies describe referential and structural aspects of experience that characterise conception and approach, respectively. For example, teachers' teaching experiences can be described by: *referential aspects* that characterise *what* teachers think about teaching and their experiences of teaching; and *structural aspects* that describe *how* teachers act or how they carry out their teaching (Ellis et al. 2006). This relationship is depicted in Fig. 1.

The structural aspect is called the "how" component or "approach"; it depicts how people go about a phenomenon (Trigwell 2000). In this study, this structural component depicts how teachers approach teaching. This structural aspect could be further divided into two sub-components: an *intention* and a *strategy*. The former corresponds to the rationale that underpins this particular way of approaching teaching, and the latter corresponds to the act of teaching (Marton and Booth 1997).

This framework has been applied in many studies (e.g. Ellis et al. 2006; González 2012; Prosser and Trigwell 1999, 2014; Trigwell et al. 1994) and provides a well-established methodological framework for studying approaches. The present study also adopted this framework for investigating teachers' approaches to ICT-enhanced teaching in vocational education (Fig. 2).

The aim of phenomenographic research is to produce a set of categories that are logically and hierarchically organised (Marton 1994). They are referred to as "categories of description". These categories depict different ways of experiencing a phenomenon collectively by a group of people (Åkerlind 2005). Phenomenographic research emphasises structural relationships between different categories that together constitute an "outcome space" (Marton 1994). This outcome space presents an overall experience of a given phenomenon and is the final result of the phenomenographic research.

Study design

Phenomenographic studies build on a set of common principles and practices (Åkerlind 2012; Marton 1981; Marton and Booth 1997; Trigwell et al. 1994). They were followed in this study. The main characteristics of the sample, data collection techniques and analytical procedures are detailed below.
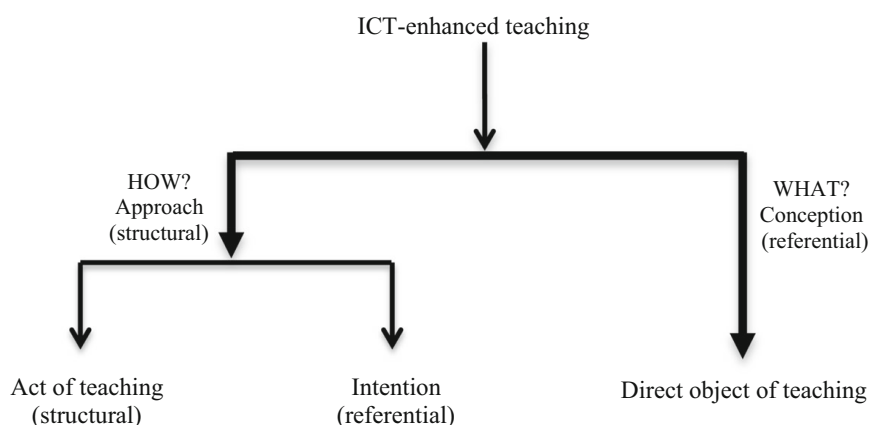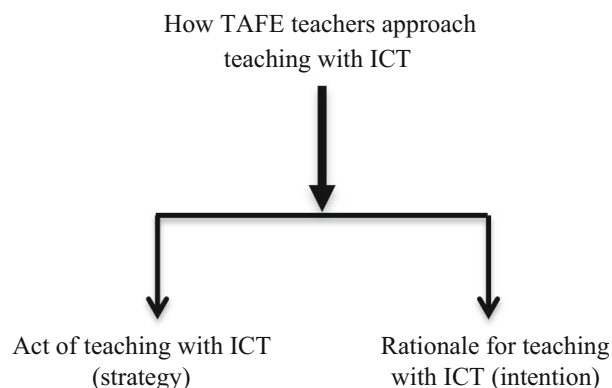

Fig. 1 Experience of teaching, adopted from Ellis et al. (2006, p. 245)

Fig. 2 TAFE teachers
approaches to teaching with ICT,
adopted from Ellis et al. (2006,
p. 245)

How TAFE teachers approach
teaching with ICT

Act of teaching with ICT
(strategy)

Rationale for teaching
with ICT (intention)

Sample

In phenomenographic studies, the selection of participants aims to ensure maximum
variation in participants' experiences and, consequently, in their ways of seeing a particular
phenomenon. In order to maximise variation, this study followed four main principles:

(1)   As teaching approaches and the use of ICT could vary across different disciplines
       (Lindblom-Ylänne et al. 2006), it was aimed to sample teachers from different
       vocational courses that aim to prepare students for professional work, including
       technical and social professions.
(2)   In order to achieve sufficient diversity and saturation, it was aimed to recruit about
       20 participants, which is a typical recommended sample size (Trigwell 2000).
(3)   As all participants should be familiar with a phenomenon under investigation, only
       those teachers who had experience of ICT use for teaching were selected.
(4)   As ICT-enhanced teaching includes various teaching modes, such as face-to-face,
       blended and online, it was aimed to sample participants who used ICT in different
       modes.

Other participants' characteristics, such as teaching with ICT experience, level of
teaching and gender, were also considered. The main aim was to ensure sufficient diversity
within the sample. Based on these principles, 23 participants from three TAFE institutions
in Australia were selected. The main characteristics of the sample are summarised in
Table 1.

Data collection

Interviewing is the preferred data gathering technique in phenomenographic research
(Åkerlind 2012; Marton and Booth 1997). Therefore, a semi-structured interview protocol
was developed for this study. A set of initial questions was constructed in order to gain an
in-depth insight into TAFE teachers' experiences of using ICT in their teaching. The
interviews started with broad "How" type questions, for example: *How do you use ICT in
your teaching?* They were followed by a number of clarifying questions and prompts, such
as: *Could you explain that further? Why is it important?* Following Marton and Booth
(1997)'s recommendation, the main emphasis of the follow-up questions was on the
interviewee's experience of a particular aspect in a state of in-depth understanding. All
interview questions were open-ended to allow the interviewees to describe their own

Table 1 Main characteristics of the study's sample

Characteristics	Description
Disciplines	Teachers were selected from 12 disciplines: six from ICT, two from Electrical Engineering, two from Mechanical Engineering, one from Refrigeration, one from AutoCAD, one from Civil Engineering, one from Manufacturing, three from Accounting, two from Finance, two from Business Studies, one from Event Management and Tourism, and one from Community Services
Experience of teaching with ICT	All teachers had experience of teaching with ICT: 1–5 years—six teachers; 6–10 years—six teachers; and 11 years or more—11 teachers
Teaching position	The sample comprised 19 full-time teachers and four part-time teachers
Teaching mode	Fourteen teachers used ICT in face-to-face teaching, and nine teachers used ICT in blended teaching
Teaching level	Participants taught diploma/certificate, advanced diploma and degree-level courses: nine participants taught diploma/certificate and advanced diploma courses; 12 participants taught diploma/certificate, advanced diploma and degree-level courses; and two participants taught only degree-level courses
Gender	Sixteen males and seven females were recruited

experience as completely as possible. The interviews took 40–60 min and were digitally audio-recorded.

Analysis

All interviews were transcribed verbatim by the first author. Then, the transcripts were analysed using an iterative phenomenographic process (Åkerlind 2005; Bowden and Green 2005; Marton 1981). It included the following main stages. In the first stage, all transcripts were read several times aiming to become well familiar with their content. This was followed by a more concentrated reading in the second stage. The main aim was to deduce similarities and differences in meanings expressed by the participants and also to select the extracts that summarised all relevant ideas (Bowden and Green 2005; Gonzalez 2010). In the third stage, the central elements of the participants' answers were identified and labelled. These labels constituted a preliminary list of categories. The fourth stage involved the revision of the initial list by making comparisons among the preliminary categories. Each category was also checked several times with the transcripts in order to make sure that the essence of the category was justified and supported by data. The final *outcome space* emerged through the detailed elaboration of the categories of description and the analysis of the relationships among the categories (Bowden and Green 2005). The categories and the relationships were carefully checked and refined through back-and-forth discussion within the research team. After, the results were validated through feedback from two colleagues who had phenomenographic research experience.

Findings

The five qualitatively different approaches to ICT-enhanced teaching were identified. They ranged from a teacher-focused to a student-focused view of teaching. These approaches were associated with particular combinations of intentions and strategies.

A. A teacher-focused, information-oriented strategy with the intention of effectively delivering subject content;
B. A teacher-focused, feedback-oriented strategy with the intention of achieving intended course outcomes;
C. A teacher-focused, practice-oriented strategy with the intention of linking theoretical and practical knowledge;
D. A student-focused, facilitation-oriented strategy with the intention of creating active learning opportunities for developing students' understanding;
E. A student-focused, industry-oriented strategy with the intention of developing students' knowledge and skills to meet industry's needs.

Each approach is described below, with a brief explanation of key elements and quotations from the interviews.

Approach A: a teacher-focused, information-oriented strategy with the intention of effectively delivering subject content

In this approach, the teacher adopts a teacher-focused, information-oriented strategy. The *intention* of using ICT is to enhance effective delivery of content. Teachers use various *strategies* and utilise myriad technologies in their classes to convey necessary subject knowledge and concepts. ICT tools, such as PowerPoint presentations, YouTube videos, search engines and shared drives, allow teachers to prepare and present subject content and to share course materials. ICT makes teaching tasks easier and helps teachers to deliver the lesson effectively.

> If I write on the board, I have to turn my back … and they actually talk. But the computer is set out, I can look at students as well, so I can actually know [see] what they are doing and I can actually get attention from them as well, not only saving time, so it is much more efficient. (P08)[1]

Teachers, in this approach, are seen as subject matter experts who are the main source of disciplinary knowledge. Teachers manage lectures, deliver essential information and show video presentations to students. In contrast, students are perceived as relatively passive participants, who mainly listen to teachers and follow their instructions. For example, students gain information from teachers during lectures, receive teachers' notes and other learning materials.

> Very simple, ICT enables me to use my own notes, so I am just, conveying my notes to them. (P22)
> It [ICT] is ready access of information and then you [teacher] can deliver it effectively to students by using it (P07)

Thus, the main *orientation* of teachers' activities is provision of subject content and other information.

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[1] A code at the end of each quotation refers to a particular participant.

Approach B: a teacher-focused, feedback-oriented strategy with the intention of achieving intended course outcomes

Approach B is one in which teachers embrace a teacher-focused, feedback-oriented strategy. The *intention* of this approach is to achieve specific teaching and learning outcomes. The employed *strategies* place emphasis on assessment and provision of immediate feedback to students regarding their level of understanding of the content recently taught. Similar to Approach A, Approach B involves the delivery of content or other necessary information using various ICT-based tools, such as PowerPoint, YouTube, learning management system (LMS), GoogleDocs and Dropbox. However, in Approach B, lessons are also supplemented with assessment that draws on different methods, such as online quizzes and tests, short questions and other techniques for instant assessment and feedback.

> Well, I [teacher] am writing the questions on Moodle. I am editing and delivering the PowerPoints and that lesson. And I am finding questions and giving feedback and just doing what a normal teacher or a face-to-face teacher would normally do. (P01)

An important aspect of this approach is a clear *orientation* towards achieving learning objectives. For this, teachers also deploy ICT for remedial teaching that helps students to catch up on what they were not able to understand in a lesson or offer other kinds of assistance that helps students to overcome specific learning challenges. In order to sustain students' interest, some teachers also employ different motivational techniques, such as presenting different types of rewards and praise.

> I give them prizes, and sometimes it's a chocolate or a water bottle or a key-ring and I act like though it's small stuff and just give them encouragement. (P23)

As in Approach A, teachers are the primary source of information. In most cases, students are not perceived as being proactive. Rather, they gain subject knowledge and information from teachers. However, in Approach B, differently from Approach A, students' participation in teaching–learning process is enhanced through teacher assessment and feedback. Through engaging with tasks set by teachers and receiving feedback, students gain possibilities to monitor their learning progress.

> The exam is online and all are multiple choice questions, and students answer it and after a while they can see the mark. Then they know where they are, they know their own learning process. And also for me, I extend and say "all right, they have learnt this part there" and in some other part, they get very low marks, and it means I need to give them more help and assistance for that part. (P23)

Approach C: a teacher-focused, practice-oriented strategy with the intention of linking theoretical and practical knowledge

Approach C is similar to Approaches A and B, in terms of adoption of a teacher-focused strategy, but the *intention* shifts towards linking theoretical understanding with practical skills. The teaching *strategies* focus on provision of necessary knowledge with related activities to ensure that students understand and can apply subject content. Teachers' roles, in terms of delivering information to students, in Approach C, are similar to the previous approaches. However, the distinct feature of this approach is its explicit *orientation* towards students' capability to apply learnt content. For instance, teachers provide students with the necessary information, which is followed by the summary of the main points.

Then, teachers give relevant tasks to students to be performed either in groups or individually, aiming to ensure that students understand the content and can solve given problems.

> When I start a topic, I explain [to] them the aim of the topic, what is the objective of this topic, and the outcome they are going to achieve at the end of the day. Then normally, we continue with the basic principles and we go through. At times the students are asked some questions, and we communicate as we go by. So once the topic is covered, then they just go straight to the exercise we work on. So there is more towards …, because we are practical based, they have to generate drawings: that is the ultimate goal. They are to follow the standards, so we teach them the standards. (P17)

Teachers mainly focus on conveying theory and managing the instruction by assisting students to understand concepts, helping them to access more information and giving them related activities. To compare to the previous two approaches, in Approach C, students' role shifts towards more active participation in practical activities. Students are seen as having two main roles: listening to teachers when they explain the main ideas and then actively participating in learning opportunities created by teachers to apply this knowledge. However, students' agency is limited, because students depend on teachers' instructions and do not take responsibility for directing their learning.

> Sometimes, as a teacher, I am the source of all information and I use a didactic method.… In this particular course, my role is partially facilitative in the sense that I assist them in understanding the project and accessing information that they need, so it's somewhat advisory. I help them with the technology, but I also will have little brief periods of straight instruction to give them enough information so that they can deal with the technology. (P15)

Approach D: a student-focused, facilitation-oriented strategy with the intention of creating active learning opportunities for developing students' understanding

Approach D represents a qualitative shift in *strategy* from teacher-focused to student-focused teaching. The *intention* is to provide students with an environment that is conducive to active learning. The main focus is on student development, and ICT is perceived as an affordance offering an opportunity to create a supportive space that allows engaging students with more self-directed and autonomous learning. ICT provides students with a platform in which they can work and learn together. For instance, students engage in joint problem-solving activities, work on different projects and actively participate in group discussions using LMS. Sharing knowledge among students is another important aspect of Approach D. Students engage in asynchronous and synchronous interactions using various communication media, such as email, LMS and mobile software applications. ICT, in some cases, is also used for collaboration and communication between students and teachers. All of these activities focus primarily on students' active participation in learning.

> Students are able to post their comments and post their requests and sometimes they like, on the Wiki, they can actually post some of their own viewpoints, creating a small page of their own. Adding that to the Wiki that I have already got there. So they become authors over there. So in that process it becomes a collaborative, collaborative [sic] piece at the end of semester, so at the end of the semester they

scroll up, they can see what the discussion has been through the whole semester. And that content has been provided not only by the teachers but by the students as well. So that is how they [students and teachers] became collaborative. It is collaborative in a structured way, it is not loosely collaborative, that is, nobody can just keep posting. There is posting to a particular topic or ask a question is being answered but this question has been answered in this open space where people can see each other's responses. (P19)

This approach has a clear *orientation* towards facilitation. Teachers do not see themselves as providers of information, but as facilitators who are responsible for creating an environment for students' autonomous meaning-making and learning. Students are seen as having to take a proactive role and responsibility for managing their learning process and developing their understanding.

I think that the students need to take responsibility for their own learning as well. It's an adult learning environment. Nobody else is going to be able to do it for them. My job is to facilitate that learning. (P12)

Overall, Approach D differs from the previous approaches as it adopts student-focused, facilitation-oriented strategies that are manifested in students' engagement in shared activities and mutual support in the teaching–learning process. It also focuses on peer-to-peer exchanges of ideas and feedback in the online as well as in face-to-face contexts that are rarely found in Approaches A, B and C.

It's coming back to that facilitative model, it's not just about "you [students] sit there and listen, and we will talk". But it's about students engaging with the technology, interacting with it, using the resources around them, the online things and learning from it. (P13)

Approach E: a student-focused, industry-oriented strategy with the intention of developing students' knowledge and skills to meet industry's needs

Teachers, in Approach E, adopt a student-focused, industry-oriented strategy. The *intention* is to develop students' knowledge, skills and other attributes related to industry needs. Similarly to Approach D, this approach focuses on students' proactive engagement with learning. However, Approach E differs from Approach D, as the nature of students' engagement and teachers' activities extends to workplace. Approach E emphasises the provision of an extended space that links student-centred learning activities with the professional world. For instance, online discussion forums are expanded with possibilities for students to interact with industry practitioners. Students also are encouraged to conduct research and gain knowledge and skills that are needed for future employment.

The ICT is again the tools they need, it's the heart of the course, the technology they need to learn, it is the skills which is [sic] required for the industry, and the technology that are needed for employment. (P13)

ICT is also seen as a tool for collaborative learning and networking with others by using different social media (Facebook, LinkedIn) to keep up to date on latest and emerging trends in the industry. This way, students are able to build networks with professionals and experts in the relevant fields, the academic community and peer groups.

I wanted the students to be involved, create up [sic] some opportunities, so when we started talking about social media in classes and marketing and advertising, I got the

students to create their own Facebook page, and then we actually had to create it to see how many people got likes. (P12)

Approach E has a clear *orientation* towards developing students' knowledge and skills needed to succeed in industry, which is not seen in the previous approaches. Teachers organise and encourage students to participate in relevant professional practices. They provide students with opportunities to take part in work placements and to gain work experience. In addition, experts from relevant industries visit the TAFE institutions to give students an insight of what is currently happening in their industry.

We have to be aware what the other companies [are up to]. Always we have a meeting with the companies, we invite them to give lectures to our students to give them an idea about the current technology and what they think about future technology, and we have a very good communication with the industry to see their implementation of such things. (P10)

As a result, students have opportunities for collaboration, research and work with related professional groups. This helps to achieve competencies that meet current workplace needs.

They [students] do research on what is happening [in the industry], for example, in the latest cabling structure, information, or in wireless technology or fibre optic, although it depends on the topic, or how to configure a router or how to do problem solving. So the skills that they are developing, I think, are much broader than the actual requirement of the unit. (P05)

Teachers, in this approach, act as facilitators. While this facilitative role is common to Approaches D and E, Approach E involves an additional and qualitatively different teacher's role of helping students to cross the boundary between learning and workplace. One of the main teachers' tasks is to create a learning environment that exposes students to industry. This aspect is not seen in other approaches.

Relationships between the approaches

Each ICT-enhanced teaching approach is qualitatively distinct in nature and includes certain dominant aspects. On the basis of these dominant aspects, the relationships between the approaches have been established. The main aspects that were taken into consideration are: (1) teacher's and student's roles and (2) orientation that is associated with the structural component of the study's framework; and (3) intention, which is associated with the referential component (Fig. 2). Table 2 presents the *outcome space* of this phenomenographic study. It shows the main relationships between the referential (intention) and structural (strategy) components of each approach.

Who is playing the central role in teaching was the main overarching aspect for establishing the structural component and the relationships among the identified approaches. Approach A is seen as a teacher-focused approach where teachers play the important role of conveying the content and managing teaching, whereas students are seen as receivers of the information. Therefore, Approach A is classified as a teacher-focused. Similarly, Approaches B and C also fall into teacher-focused categories. In contrast, Approach D is viewed as a student-focused approach as in this approach teachers are seen as playing facilitators' roles, and students are viewed as taking the responsibility for their own learning. In Approach E, students are also seen as playing the main role, but their

Table 2 Outcome space: intention and strategy components

Intention (referential)	Strategy (structural)				
	Teacher-focused			Student-focused	
	Information-oriented	Feedback-oriented	Practice-oriented	Facilitation-oriented	Industry-oriented
Effectively delivering subject content	A				
Achieving intended course outcomes		B			
Linking theoretical and practical knowledge			C		
Creating active learning opportunities for developing students' understanding				D	
Developing students' knowledge and skills to meet industry's needs					E

authentic engagement with professional field is greater than in all other approaches. In this approach, teachers see themselves as having an additional role of helping students to cross the boundary between the learning setting and future workplace. Accordingly, their teaching focus is on connecting students' learning experiences with workplace and helping students to gain an authentic insight into industry.

Overall, teachers' approaches to ICT-enhanced teaching could be broadly characterised by two broad strategies: teacher-focused and student-focused (Table 2). These two broad strategies encompass five main orientations: (1) information-oriented; (2) feedback-oriented; (3) practice-oriented; (4) facilitation-oriented; and (5) industry-oriented. These orientations characterise distinct ICT's roles in teaching and learning. The first three orientations have the main emphasis on ICT use in teachers' activities, whereas the last two orientations place the main emphasis on ICT's role in students' activities.

Most importantly, these five orientations relate to five different intentions, which characterise why ICT is used in teaching. The first three intentions—effectively delivering subject content, achieving intended course outcomes and linking theoretical and practical knowledge—primarily see ICT as means for effective transfer of knowledge from a teacher to a student. In contrast, the last two intentions—creating active learning opportunities for developing students' understanding and developing students' knowledge and skills to meet industry's needs—see ICT as a medium that enables and facilitates active learning.

These approaches hierarchically build on each other and are not necessary mutually exclusive. For example, teachers who described their teaching with ICT primarily in the student-focused facilitation-oriented ways also sometimes referred to the importance of effectively delivering subject content, achieving learning outcomes and giving to students practical tasks. However, the latter aspects were not the main motives for using ICT. Rather, by using ICT teachers aimed to provide students with opportunities to develop authentic understanding.

Discussion and conclusions

The findings of the present study show that the TAFE teachers' approaches to ICT-enhanced teaching in vocational courses fall on the continuum between teacher-focused and student-focused approaches. These findings are consistent with the general approaches

to face-to-face teaching reported in the majority of previous studies in tertiary education (Kember and Kwan 2000; Samuelowicz and Bain 2001; Trigwell et al. 1994). In this study, the teachers who adopted the teacher-focused approaches viewed themselves as subject matter experts, who were responsible for providing information and subject content, while students were mainly seen as recipients of this information and knowledge. ICT tools were perceived as a means to deliver content and to share course materials. In contrast, the teachers who adopted the student-focused approaches perceived teachers' roles as facilitators, who created a space for active learning and saw students as being responsible for developing their knowledge and skills by proactively engaging in the teaching and learning process.

In relation to the studies on blended teaching in tertiary education, the present study has identified approaches to ICT-enhanced teaching ranging from using ICT with a focus on conveying information to employing opportunities opened by ICT for active learning with an emphasis on students' autonomous knowledge construction and readiness for workplace. Parts of the findings of the present study are in line with the previous studies. For example, TAFE teachers' approaches to ICT-enhanced teaching in relation to *conveying information* are consistent with the transmissionist information-focused teaching approaches, identified by Ellis et al. (2009) and González (2012), in university teaching. With regard to the *active learning*, the study's findings are also consistent with the approaches of the prior research in higher education. In particular, this study identified a student-focused, facilitation-oriented strategy with the intention of creating learning opportunities for developing students' understanding, which primarily focused on the development of students' capabilities through active learning (Approach D). Similar approaches were found in other studies, such as González's (2012) study, which identified communication- and collaboration-focused strategies that aimed at engaging students in deep thinking and knowledge building.

Nevertheless, some important differences were also observed between the results of the present study and earlier phenomenographic research. For example, Ellis et al. (2009) identified an approach that focused on encouraging students' autonomy in learning. While this finding is in line with the present study, our study showed two possible intentions and two different strategies for achieving students' autonomy in learning (i.e. Approaches D and E). González (2012) identified a communication-focused strategy and a collaboration-focused strategy that were related to students' active engagement. The present study, in contrast, found only one general student-focused facilitation-oriented strategy related to the active learning (Approach D). However, it found an additional, industry-focused orientation of active learning (Approach E) that was not identified in the previous studies.

Overall, this study identified two strategies with five main *orientations* to ICT-enhanced teaching distributed along the teacher-focused and student-focused continuum, namely the teacher-focused strategy that comprises (1) information-oriented, (2) feedback-oriented and (3) practice-oriented approaches; and the student-focused strategy, consisting of (4) facilitation-oriented and (5) industry-oriented approaches. Our identified orientations extend the frameworks of teaching approaches revealed in the previous phenomenographic studies that primarily distinguished between the information transmission (or teacher-focused) approach and conceptual change (or student-focused) approach. In this study, we found two further teacher-focused approaches—feedback-oriented and practice-oriented. They focused not only on transmitting information, but also on providing feedback and developing practical problem-solving knowledge. Similarly, we found an additional student-focused, industry-oriented strategy that focused not only on students' disciplinary knowledge and deep conceptual change, but also on the development of students'

knowledge and skills for workplace. The above discussed feedback-oriented, practice-oriented and industry-oriented strategies have not been reported in phenomenographic studies before and offer an important addition to the existing literature. In particular, they point out to the importance of paying attention not only to the general teachers' strategies, but also to their orientations as these orientations are critical for understanding how teachers use ICT.

In addition, this study identified five *intentions*. They are: (1) effectively delivering subject content; (2) achieving intended course outcomes; (3) linking theoretical and practical knowledge; (4) providing opportunities for active learning for developing students' understanding; and (5) developing students' knowledge and skills to meet industry's needs. Some of these intentions are in line with the previous studies. Specifically, the intentions similar to (1), (2) and (4) were also found in the studies by Trigwell et al. (1994), González (2012) and Bliuc et al. (2012) that were conducted in diverse teaching contexts. For example, the main focus of intention (4) on developing students' understanding is in line with the intention of conceptual development found by Trigwell et al. (1994) and the intention of engaging students in deep thinking found by González (2012). However, the intentions (3) and (5) have not been found in the prior studies.

We believe there are two main possible reasons for identifying these new orientations and intentions. First, our study extends the traditional research context for investigating tertiary teachers' approaches from university to TAFE sector. As prior studies showed, teaching at TAFE level is different from teaching at the university level as vocational education typically has a strong focus on developing students' competencies needed for immediate employment (Carter and Ellis-Gulli 2014; Kloppenborg, 2010). Further, in our study, we investigated teachers' approaches to ICT-enhanced teaching in vocational courses that aim to prepare students for profession rather than traditional academic disciplines (such as maths or history). Therefore, our findings present an important insight into distinctiveness of ICT use in profession-oriented teaching.

Second, our sampling had a broad disciplinary coverage and included professions that were rarely investigated in other studies (Table 1). While our identified approaches are not linked to any particular discipline or profession, literature shows that various professional fields tend to develop particular ways of teaching (Nerland and Jensen 2014). For example, we also observed that teacher-participants from IT departments used extensively feedback-oriented strategies in their teaching, whereas the teachers from electrical and management departments tended to adopt industry-oriented strategies. Overall, our broad sample coverage allowed us tap into a broader range of approaches and present a comprehensive outcome space.

The results of this study have both theoretical and practical implications. Firstly, the study provides important empirical evidence about teachers' approaches to ICT-enhanced teaching in vocation-oriented professions and fills an important gap in the literature. These findings provide new understanding about ICT-enhanced teaching in TAFE sector and make an important theoretical contribution to this domain.

Secondly, the study also contributes to general theoretical developments in tertiary education. Specifically, by paying close attention to the teachers' orientations, this study reveals new ways of approaching ICT-enhanced teaching that were not found before, such as feedback, practice and industry-oriented approaches. These skill-oriented teaching approaches are important across all tertiary sectors, including vocational education within TAFE institutions and professional education within universities.

Third, this study provides some insights into teaching practices that could be used in TAFE teachers' professional development. For instance, teachers who use only teacher-

focused approaches to ICT-enhanced teaching could be offered academic development programs that introduce them to student-centred pedagogies and in this way help teachers to expand their teaching approaches. As some previous studies claimed, the change in teaching approaches could lead to better learning outcomes (Prosser and Trigwell 1999).

Fourth, the findings reported here also provide empirical support for curriculum improvement. TAFE courses generally focus on practical, task-oriented teaching and learning and aim to provide students with the necessary knowledge and skills needed to meet workforce requirements of the related industry (Agbola and Lambert 2010). This study also shows that some TAFE teachers' ICT-enhanced teaching approaches have similar practical focus, particularly Approach C and Approach E. The former approach provides an important general insight into the nature of TAFE teaching and indicates that TAFE teaching emphasises the link between theoretical knowledge and practical skills. The latter approach shows that TAFE teachers practise specific industry-oriented teaching approaches that explicitly introduce students to the realities of the workplace and aim to prepare students for immediate employment. Yet, this approach simultaneously fosters students' agency and autonomy and has a potential to develop more general students' attributes and skills. These two findings provide useful knowledge, which could be used for rethinking how to prepare students for workplaces more productively.

Finally, it is acknowledged that this study was primarily based on interview data and exploration of teachers' own accounts of their approaches to ICT-enhanced teaching. A substantial number of previous studies also relied on interview data (Åkerlind 2004; Ellis et al. 2006; Gonzalez 2010; Trigwell et al. 1994). However, Kane et al. (2002) have argued that what teachers say about teaching and what they do in the classrooms are not necessarily the same. The present study acknowledges that teachers' reported experiences might not necessarily equate with their actual teaching practices. Therefore, further research could be conducted to explore the congruence of what teachers said during interview with what they actually do in the classroom.

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