"A problem shared is a problem halved": Supporting early career science teachers to implement flipped learning

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There is widespread support in the educational reform literature for learner-centred teaching practices, such as flipped learning, that emphasise academic rigour in a caring, supportive environment. These practices are typically emphasised during teacher training. However, when faced with the myriad challenges of beginning to teach, the early career teacher will often avoid ambitious, learner-centred pedagogies and revert to less challenging, teacher-centred practices. This study employed a longitudinal, case study research design to investigate how three early career science teachers implemented flipped learning, when supported with flipped learning curricular resources. Results indicate that the teachers were successful in implementing flipped learning and learner-centred practices in their first year of teaching. The flipped learning curricular resources supported the professional learning and learner-centred teaching practices of all of the early career teachers. This research has implications for sharing of curricular resources to support teacher professional learning and learner-centred teaching practices. From this study recommendations have been made for implementing flipped learning during emergency remote teaching.

Introduction

Learner-centred pedagogies can be conceptualised as a collection of constructivist teaching practices that foster high academic achievement in a supportive, positive learning environment by having a dual focus on the learner and learning (Cornelius-White, 2007; Weimer, 2013). There is widespread support in the educational reform literature for teaching practices that are learner-centred (e.g. Cornelius-White, 2007; Darling-Hammond, 1996; Weimer, 2013). Learner-centred pedagogies are typically emphasised in teacher-preparation programs, however, early career teachers often avoid ambitious, learner-centred pedagogies and adopt less challenging, familiar, teacher-centred practices when faced with the myriad challenges of beginning to teach (Allen, 2009; Anagnostopoulos, Smith & Basmadjian, 2007; Buchanan, Prescott, Schuck, Aubusson, Burke & Louviere, 2013; Cherubini, 2009; Thompson, Windschitl & Braaten, 2013). The countless challenges facing early career teachers include heavy workloads, inadequate mentoring and induction, lack of support from experienced colleagues, and lack of quality resources (Feiman-Nemser, 2003; Hebert & Worthy, 2001; Ingersoll & Strong, 2011). In the absence of quality support, early career teachers may adopt any practices they can to survive in the teaching environment (Feiman-Nemser, 2001).

The provision of teacher professional learning in the first years of teaching is critically important for success and retention (e.g., Feiman-Nemser, 2001; OECD, 2009). Quality induction and mentoring programs, a supportive collegial work environment, and access to quality teaching resources are associated with better teaching practices, higher teacher retention, higher job satisfaction and improved student performance (e.g., Buchanan et al.,

2013; Ingersoll & Strong, 2011). The availability of quality curricular resources is one support that has been shown to influence the teaching practices and professional learning of early career teachers (Allen, 2009; Buchanan et al., 2013). When teachers are supported with quality teaching resources, they are capable of implementing more ambitious, learner-centred practices in their first years of teaching (Darling-Hammond & Macdonald, 2000). One such learner-centred pedagogy is flipped learning. Flipped learning is a learner-centred, constructivist pedagogy where students initially learn course concepts independently, at their own pace, and then practise and deepen their knowledge through engagement in active, collaborative tasks, in class (Bergmann & Sams, 2012).

The aim of this study was to investigate how early career teachers can be supported to effectively implement learner-centred teaching practices within their first years of teaching, when they are supported by shared flipped learning curricular resources. This research has implications for supporting teachers at all career stages to implement effective learner-centred teaching practices through the sharing of flipped learning curricular resources. The following section will outline the flipped learning and learner-centred pedagogy literature that supports this study.

Literature review

The following section will review the learner-centred pedagogy and flipped learning literature to highlight the affordances of learner-centred pedagogy and flipped learning. In addition, the section will demonstrate how flipped learning is a learner-centred pedagogy.

Learner-centred pedagogy

There is widespread support in the educational reform literature for teaching practices to be learner-centred (e.g. Cornelius-White, 2007; Weimer, 2013). Learner-centred pedagogy incorporates a collection of different teaching practices that shift the focus from the teacher and teaching, to the learner and learning, in a positive and supportive learning environment (Cornelius-White, 2007; Weimer, 2013). Through a critical review of the learner-centred literature, four key principles of learner-centred pedagogy have been developed: differentiated instruction; positive teacher-student relationships; student choice and control of their learning; and active learning.

The first principle of learner-centred pedagogy is differentiated instruction which can be defined as a teacher's response to learners' needs by modifying the content, teaching strategy, timing and/or assessment to meet the individual needs of students (Coubergs, Struyven, Vanthournout & Engels, 2017; Tomlinson, 2014). The individual needs may relate to the student's readiness, interest and learning profile (Tomlinson, 2014). A central conception of learner-centred pedagogy is that each learner comes to class with a unique version of reality they have constructed based on their beliefs and experiences (McCombs, 2003). Taking the time to understand the learner's perspective makes the learner feel understood, valued and known (McCombs & Whisler, 1997). The second principle of learner-centred pedagogy is that learning is most effective in positive learning

environments with supportive, interpersonal relationships where students feel safe, valued, respected and acknowledged (McCombs & Miller, 2007). Students are more motivated to learn when they feel genuinely liked, valued and respected by the teacher (Niemiec & Ryan, 2009). Research conducted by Meece, Herman and McCombs (2003) identified the largest predictor of a number of academic engagement and performance outcomes was student perception of a positive learning environment.

The third principle of learner-centred pedagogy is developing strategies that provide learners with personal choice and control over their learning (McCombs & Miller, 2007). Research has identified when students have some choice and control over their learning, they are more motivated to learn, their academic performance is enhanced (Reeve, Jang, Carrell, Jeon & Barch, 2004) and they are more capable of self-regulating their learning behaviours (Zimmerman, 2002). A final principle of learner-centred pedagogy is learning is most effective when it is active (McCombs & Whisler, 1997; Meece et al., 2003). Active learning involves a range of activities that are often hands-on and are always *heads-on,* where students actively participate in their learning in order to process, organise and make meaning of concepts (Hake, 1998, Meece et al., 2003). There is a considerable body of research that supports the efficacy of active learning (Freeman, et al., 2014; Michael, 2006; Prince, 2004). Whilst active learning strategies vary greatly, there are two consistent aspects; learners are active and the activities involve learning (Weimer, 2013).

The benefits of learner-centred practices have been extensively studied across all sectors of education for over 70 years (Cornelius-White, 2007). There is a strong, positive correlation between learner-centred practices and cognitive and behavioural student outcomes, student participation, motivation and satisfaction, and critical and creative thinking (Cornelius-White, 2007).

Flipped learning

Flipped learning is a constructivist, learner-centred pedagogy where course concepts are introduced prior to class and class time is used for active, collaborative learning tasks to productively practice and deepen knowledge (AALAS, 2018; Abeysekera & Dawson, 2015). Through a critical review of the flipped learning literature, the learner-centred affordances of flipped learning have been identified. Firstly, flipped learning supports differentiation because it allows the teacher to provide the most help to the students who most need it (Bergmann & Sams, 2012). In addition, the use of video in the flipped learning classroom allows students to work at their own pace by pausing and rewinding the lesson as needed and re-watching the video as often as required (Bergmann & Sams, 2012; Boevé, Meijer, Bosker, Vugteveen, Hoekstra & Albers, 2017). Secondly, flipped learning fosters positive teacher-student relationships because interactions between the teacher and the students can be more frequent due to the reduced emphasis on direct instruction during class time (Abeysekera & Dawson, 2015; Bergmann & Sams, 2012). Thirdly, flipped learning provides students with choice and control over the time, place and pace of their learning (Bergmann & Sams, 2012; Lage, Platt & Treglia, 2000). Fourthly, flipped learning supports active learning because moving the information-

transmission component of instruction out of the classroom allows more class time for active learning tasks (Abeysekera & Dawson, 2015; Bergmann & Sams, 2012; Talbert, 2017).

A final learner-centred affordance of flipped learning is that it may facilitate student motivation by fostering autonomy, relatedness and competence (Abeysekera & Dawson, 2015). Autonomy relates to the sense of being independent, relatedness is a sense of connection with others and competence is feeling able to master the skills and behaviours required for success (Deci & Ryan, 2002). Active participation in collaborative classroom tasks is likely to satisfy students' needs for relatedness and autonomy. In addition, being in control of the pace in which students learn new content is likely to foster autonomy and competence (Abeysekera & Dawson, 2015; Muir & Geiger, 2016). Using video lessons may improve students' sense of competence because they perceive video lessons support learning, make the concepts easier to understand, and improved test performance (Muir & Geiger, 2016). Video lessons made by the students' teacher may also foster a sense of relatedness (Muir, 2018).

There has been an exponential increase in flipped learning research over the past decade, with the evidence base for the efficacy of this pedagogical approach continuing to grow (Abeysekera & Dawson, 2015, Bishop & Vergler, 2013; Talbert, 2017). The majority of flipped learning research has been conducted in the undergraduate, tertiary sector utilising quantitative, short duration (typically one semester or less) research designs, typically comparing student performance in a flipped student cohort with a non-flipped student cohort (e.g., Cheng, Ritzhaupt & Antonenko, 2019). Empirical studies have identified a range of beneficial outcomes of flipped learning including improved: academic performance; self-efficacy; motivation; and student engagement (Cheng, et al., 2019; Davies, Dean & Ball, 2013; Steen-Utheim & Foldnes, 2018; Talley & Scherer, 2013; Van Sickle, 2016).

Summary and aim of research

The above literature has illustrated the benefits of learner-centred pedagogy and demonstrated how flipped learning is a learner-centred pedagogy. The aim of this study was to investigate how early career teachers utilise flipped learning curricular resources to implement learner-centred teaching practices. The research questions guiding this exploratory study were:

1. How do early career science teachers implement flipped learning?
2. What factors influence the way early career science teachers implement flipped learning?

Method

The study employed an instrumental case study approach and was guided by a constructivist research perspective. The research was undertaken in a naturalistic setting in the Year 9 science classes of three early career teachers. The first author in this study was

an "insider researcher" employed in the study school as a science teacher. He was an experienced science teacher who had access to the participants, familiarity with the context, and group that were being studied (Mercer, 2007; Humphrey, 2013). Science teachers were selected as participants in this study as research has indicated that science learning is optimised when students are supported to actively construct science knowledge (Cavagnetto, 2010) and flipped learning has been shown to support the active construction of scientific knowledge (Lekhi & Nashon, 2016; Leo & Puzio, 2016).

Data collection

Research methods employed for the study included interviews, classroom observations, and written and audio-visual artefacts. A range of techniques were implemented to ensure the validity of data analysis in accordance with trustworthiness criteria including member checking; peer debriefing; triangulation of data sources; and prolonged engagement (Lincoln & Guba, 1985). Data was collected in two phases for the study. Phase 1 was conducted at the end of the participants' first year of teaching while phase 2 was conducted during their second year of teaching.

In person interviews were conducted on four occasions, with each participant being interviewed, face-to-face, by the first author over the two-year duration of the study. The interviews used semi-structured, open-ended questions and were audio-recorded and fully transcribed for analysis. The interview questions in the first year were designed to gain an understanding of how the participants taught their Year 9 class, how they prepared for the lessons and used the curricular resources. The interview questions in the second year of the study were designed to gain an understanding of the participants' beliefs about teaching and learning and about how they used the curricular resources to implemented flipped learning and learner-centred teaching practices. Classroom observations were also conducted during the participants' second year of teaching and written, and audio-visual artefacts were collected from the teachers for the purpose of methodological triangulation.

Participants

The three participants for this case study were early career science teachers who commenced teaching in 2017 and taught at least one Year 9 science class. All participants were aged between 30 and 40 years and comprised one male teacher (Peter) and two female teachers (Monica and Elizabeth) (pseudonyms). All participants had previously completed a postgraduate diploma in education, and all held a science-related Bachelor degree. All participants teach at Silky Oak High School (pseudonym) in an urban city in Australia. Silky Oak is a government, co-educational high school catering for students across years 7 to 12 with a population of approximately 1800 students. Each Year 9 science class has 26-28 students.

Flipped learning curricular resources

The Year 9 science subject at Silky Oak High School was supported with an extensive collection of flipped learning curricular resources. The resources included video lessons

and workbooks that contained worksheets, activities and experiments. At the start of their first year of teaching, the flipped learning curricular resources were demonstrated and explained to the teachers. Teachers were advised to use any of the resources they felt were appropriate for their classes and were encouraged to seek clarification and assistance if required, and to provide feedback on the resources for continuous improvement. The teachers were supported with regular face-to-face mentoring, classroom visits and email support by the first author. Mentoring sessions focused on the use of the curricular resources and implementing flipped learning pedagogy. In their second year of teaching, the teachers collaborated with the first author to create a unit of work for Year 9 science and each teacher developed a unit within their area of expertise.

Data analysis

Data analysis involved evaluating the learner-centredness of the early career teachers' practices and identifying the factors that influenced their practices. The initial coding process involved reading and marking the transcripts by hand using a colour code to divide the text segments into themes. Open coding was then conducted for each interview transcript for each case. Then all transcripts were amalgamated and analysed to identify common themes and descriptions. Cross-case analysis was conducted to identify themes that emerged across all cases (Patton, 2002). The major themes and descriptions that emerged from the cross-case analysis formed the major findings of the study. Classroom observations and curricular artefact data were primarily used for the purpose of methodological triangulation to cross check specific interview data and to increase confidence in the interpretations (Lincoln & Guba, 1985).

Results and discussion

This study explored how three early career science teachers implemented flipped learning when supported with shared curricular resources. In this section we demonstrate how flipped learning is a learner-centred pedagogy and discuss how the curricular resources supported the teachers to implement flipped learning.

Learner-centred teaching practices

The early career teachers' flipped learning practices were found to support four key aspects of learner-centred pedagogy: (1) differentiated instruction; (2) positive teacher-student relationships; (3) student choice and control; and (4) active learning. A model developed to conceptualise how flipped learning is learner-centred is illustrated in Figure 1. The sections below provide evidence to support how the early career teachers implemented learner-centred teaching practices through flipped learning.

Differentiation

This section discusses the ways in which flipped learning supported the early career teachers to differentiate instruction by supporting individualised instruction, allowing students to self-pace and by accommodating students' absence from class. The early

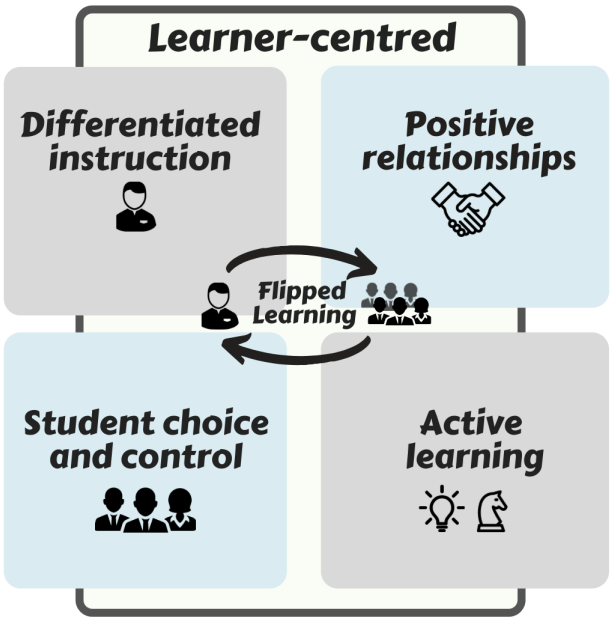

Figure 1: Principles of learner-centred pedagogy and the affordances of flipped learning

career teachers identified flipped learning supported them to individualise instruction to meet the needs of individual students. For example, Elizabeth stated, "you can implement it individually for each child." Additionally, flipped learning supported differentiation by allowing the teacher to spend more time in class with the students that need the most assistance. Monica explained she could work one-on-one with the students that most need her help: "Kids that are struggling, they can get the help they need". The early career teachers reported they were able to work with students one-on-one or in small groups to re-teach difficult concepts, check for understanding and answer questions. This finding is consistent with Bergmann & Sams (2012) who identified frequent teacher-student interactions as one of the most important affordances of flipped learning.

The early career teachers identified flipped learning also supported differentiated instruction because it supported students to learn at their own pace. For example, Monica identified students who learn the concepts quickly are not held back: "kids who are grasping the concepts don't have to wait, they can just move on". Students that learn the concepts more slowly are also supported. Elizabeth identified "the lower level kids can go over things a number of times without having to feel embarrassed that they are holding the rest of the class up". The video lessons supported differentiation because the students could access the video lessons at their own pace by pausing and rewinding the videos as required. In addition, the students were able to re-watch the videos as many times as they needed. This finding is consistent with other research that has identified video enhances personalisation as it allows students to work at their own pace (Boevé, et al., 2017).

The availability of the flipped learning curricular resources reduced the early career teachers' lesson preparation time so they could spend their time developing differentiated activities. For example, Monica devoted her time to modifying the flipped learning curricular resources to meet the specific learning needs of a vision-impaired student, a student with an acquired brain injury and a student with the intellectual capacity of a Year 4 student.

Another way flipped learning supported the teachers to meet the individual learning needs of the students was by being able to accommodate students' absences from class. The availability of the flipped learning curricular resources meant students did not miss learning concepts when absent from class. Students were able to continue learning from where they were up to on return to class or were able to continue their learning at home during their absence (Bergmann & Sams, 2012).

Fostering positive relationships

Learning is a social construct and students learn from interacting and communicating with each other, and with the teacher (McCombs & Whisler, 1997). Evidence presented in the case studies demonstrated flipped learning supports communication and social interaction between students, and between the teacher and students. Because flipped learning reduces the amount of time the teacher is instructing the whole class, the teacher is able to spend more time interacting with students one-on-one and in small groups (Bergmann & Sams, 2012). The teachers reported they were able to spend time with each student in every lesson. The early career teachers identified that the learner-centred nature of the classroom freed up the teacher to interact with individual students and build better relationships with students. For example, Monica stated, "I talk to every student, in every lesson no matter what… I think I have a better relationship with my students because I get to spend more time with them one-on-one". Peter commented the self-paced nature of flipped learning allowed him to engage with individual students each lesson instead of just "teaching faces". The increased teacher-student interaction flipped learning afforded teachers in this study is consistent with findings of other flipped learning research (McCollum, Fleming, Plotnikoff & Skagen, 2007).

Flipped learning supported the teachers to spend more time interacting with individual students, getting to know them and building positive relationships. Research has identified building positive teacher-student relationships increases student motivation to learn and enhances academic engagement and performance (Meece, et al., 2003; Niemec & Ryan, 2009). In addition, shared resources afforded the teachers preparation time and class time to tailor learning experiences to meet students' interests. Taking time to make learning individually relevant is likely to enhance student motivation because students feel valued and respected by the teacher, increasing their sense of relatedness (Deci & Ryan, 2002).

The early career teachers also identified flipped learning encouraged student-student interaction. The early career teachers encouraged students to work together, to discuss the work and to help each other. For example, when students in Elizabeth's class did not understand a concept, she would encourage the students to form a small group with

students who did understand the concept and teach each other. Elizabeth identified flipped learning frees up time for collaboration and conversation. Bergmann and Sams (2012) made a similar observation about their flipped mastery classrooms where students helped each other to learn instead of relying on the teacher. Previous research has identified the importance of positive and productive relationships between students (Mikami, Ruzek, Hafen, Gregory & Allen, 2017).

Promoting student choice and control

Flipped learning supported students to be in control of their learning. Video lessons supported students to control their learning because they were able to control the pace of the learning as well as where, when and how many times they viewed videos (Bergmann & Sams, 2012). The availability of the resources meant the teacher did not control learning and access to knowledge. The teachers identified student learning was enhanced when they had some control over their learning. For example, Elizabeth reported when she empowered students to take control of their learning the students "rose to the challenge". She observed the quality of learning in the classroom was enhanced and behaviour management issues disappeared. This finding is consistent with previous research that has identified student choice and control is associated with enhanced motivation and engagement (Jang, Reeve & Deci, 2010; Reeve et al., 2004) and improved self-regulation of learning behaviours (Zimmerman, 2002). All teachers indicated their students enjoyed the self-paced nature of the learning. Monica commented she had a student who had major attendance issues in other subjects but would never miss science and was always ahead in their work. Whilst the teachers were not able to offer students choice over what they learnt or how they were assessed, students only need a modest amount of choice for achievement and satisfaction to be enhanced (Knight & Wood, 2010; Weimer, 2013).

Active learning

The early career teachers identified flipped learning supported active learning because there was more class time available for deeper thinking and collaboration. For example, Peter stated, "the flipped learning videos allow the students to do the theory on their own, but then collaborate with the more in depth and rich tasks." Elizabeth identified active learning was what was missing from the traditional teacher-centred lesson and recognised the importance of giving students time to think and allowing them to struggle, instead of simply answering their questions. Peter commented flipped learning allowed students to spend more time collaborating with other students with rich learning tasks. Monica identified that when her students were engaged in active learning tasks, they were intrinsically motivated to learn. This finding is consistent with McCombs and Whisler (1997) who found students are more willing to learn when tasks are authentic, involve higher order thinking and stimulate curiosity. The flipped learning curricular resources supported students' active participation in their learning by providing authentic problems for students to solve, either individually or in collaboration with other students.

In summary, the teachers in this study utilised flipped learning to implement learner-centred teaching practices that were differentiated, fostered positive relationships, allowed

students choice and control over their learning, and promoted active learning. In the following section, we demonstrate how the flipped learning curricular resources supported the teachers to implement flipped learning.

Curricular resources supported teachers' professional learning

Curricular resources were found to support teachers' professional learning by reducing lesson preparation time and by helping teachers to learn the content. The early career teachers unanimously agreed the curricular resources supported their lesson planning by reducing time required to prepare for their classes. Monica compared her experiences with those of her colleagues at other schools. She reported her colleagues were spending many hours preparing resources and, as such, were uncertain whether they would remain in the profession. This is consistent with previous research that has identified a key factor in early career teacher attrition is a lack of adequate teaching resources (Buchanan et al., 2013; Queensland College of Teachers, 2013).

The flipped learning resources reduced the teachers' preparation time allowing them to spend more time on differentiation and pedagogy. For example, Elizabeth stated, "it has taken so much pressure off the prep time for actually physically getting the resources… It has given me more time to focus on my pedagogy." The resources supported the teachers to move their focus away from themselves and onto their students and the development of their pedagogy. According to the stage models of teacher development, early career teachers initially focus on themselves and then the curriculum, and only later focus on the students (Berliner, 1984; Kagan, 1992). However, with appropriate support, early career teachers can implement more sophisticated, learner-centred teaching practices earlier (Darling-Hammond & McDonald, 2000; Thompson, et al., 2013). Findings of this study are consistent with this research.

There has been some criticism of highly scripted pre-packaged curriculum because, it is argued, providing prescribed curriculum de-skills teachers and reduces their autonomy (Apple & Jungck, 1990; Mills & McGregor, 2016). In this study, each teacher was free to implement the resources in different ways depending on the specific context of the classes in which they taught. As such, the resources did not appear to compromise teacher autonomy. These findings support Kauffman, Johnson, Kardos, Liu & Peske (2002) who posited a curriculum well-resourced with instructional material can be supportive without compromising teacher autonomy.

The reduced lesson preparation burden supported the teachers to prepare a smaller number of lessons more effectively. For example, Peter created a novel, inquiry task and subsequently shared it with all Year 9 teachers. In addition, Monica had time to create differentiated resources for her students. Whilst highly scripted curriculum is unlikely to be flexible enough to meet the differing needs of individual students, curricular resources can provide teachers with much needed efficiencies (Hammerness et al., 2005). Sawyer (2004) described this as disciplined improvisation where the teacher is appropriately innovative to meet specific learning needs and exploit unique learning opportunities as

they arise. Kauffman and others (2002) also identified structured and resourced curriculum allowed flexibility and enhanced creativity rather than constraining it.

The flipped learning curricular resources supported the teachers to learn the content and how to teach it. For example, Monica explained, "when I watched the videos and saw the worksheets, I knew what was involved and how to teach it because I had all of the content there. So, it is not just what to teach but how to teach it." The teachers used the curricular resources as a professional learning tool to develop both their content knowledge and their pedagogical content knowledge. Peter stated it can be overwhelming for a new teacher to teach outside their science specialty area and the resources made him feel less overwhelmed.

The teachers in this study relied heavily on the curricular materials in their first year of teaching and, over time, tended to adapt the resources to meet the specific learning needs of their classes. This is consistent with other research that has identified early career teachers' dependence on curricular materials reduces with experience (Grossman & Thompson, 2008; McDonald, 2016; Stern & Roseman, 2004). The early career teachers commented they appreciated the resources were easily accessible, clearly sequenced and included an appropriate amount of resources. Peter reported, for other subjects he taught, there were too many resources and it was overwhelming having to search through the resources to decide what to use. This is consistent with Kauffman and others (2002) who found in the absence of guidance, having too many resources may be as problematic as having too few. Teachers may feel overwhelmed with the volume of seemingly unrelated, or poorly aligned, material to be organised and sequenced into lesson plans (Kauffman et al., 2002).

In summary, shared flipped learning resources supported the teachers to implement learner-centred teaching practices and supported their professional learning. In the following section, we make recommendations for the implementation of flipped learning during periods of remote and hybrid learning.

Implications and recommendations

The above findings demonstrate flipped learning curricular resources supported the early career teachers to implement learner-centred teaching practices. Shared curricular resources may also be useful to support teacher change regardless of the stage of their career, particularly when teachers are being supported to develop more learner-centred practices. Shared resources may allow teachers to investigate learner-centred practices using proven resources without the time commitment of having to search for and create resources. Being able to implement learner-centred practices in a supported environment may maximise teachers' chances of experiencing success. Research has found teachers' positive experiences implementing teaching practices supports positive attitudes towards the practices (Bandura, 1986).

Supporting teachers to implement flipped learning with supplied curricular resources is under-investigated and under-theorised in the flipped learning and teacher education

research fields. However, anecdotal evidence suggests flipped learning curricular resources can support teachers to implement learner-centred practices regardless of the stage of their teaching career. Further research is needed to investigate the utility of shared resources to support teachers to implement learner-centred practices.

The early career teachers involved in this study also used the flipped learning curricular resources during periods of emergency remote learning in response to the COVID-19 pandemic. Their previous experience with flipped learning and learner-centred pedagogy supported them to implement asynchronous remote learning highly effectively and efficiently. A recommendation from this study is for teachers to consider implementing flipped learning when designing learning programs for periods of remote and hybrid learning for three key reasons. Firstly, teachers have identified high levels of student disengagement with remote learning (Lucas, Nelson & Sims, 2020; Mohan, McCoy, Carroll, Mihut, Lyons & Mac Domhnaill, 2020). This study has demonstrated flipped learning is learner-centred and learner-centred pedagogies support student engagement by providing a positive, supportive and motivating learning environment (Cornelius-White, 2007). Secondly, an asynchronous lesson delivery method, where students learn new concepts individually through video lessons or readings, will address inconsistent access to online learning (Mohan et al., 2020) and will give students flexibility to manage their school and home responsibilities (Daniel, 2020). Thirdly, the transitions between remote, hybrid and face-to-face learning will be more rapid and efficient if the students and teachers are already familiar with flipped learning.

A further recommendation from this study is for teachers to share flipped learning curricular resources to reduce the lesson preparation workload. During the recent period of remote learning due to the Covid-19 pandemic, teachers reported significant workload intensification associated with adapting their lessons for remote learning (Mohan et al., 2020; Phillips & Cain, 2020). This study has demonstrated sharing flipped learning curricular resources supports teachers to implement flipped learning using established resources without the time burden of having to search for and create all of their own resources. Teachers may create a smaller number of resources and pool them with their teaching team or source existing flipped learning resources. To ensure teacher autonomy is not compromised, teachers need to be free to implement the resources in the way that best meets the needs of their classes.

Conclusion

The results of this study have demonstrated early career teachers are capable of implementing effective, learner-centred teaching practices in their first years of teaching when supported with flipped learning curricular resources. Analysis of the early career teachers' practices demonstrated flipped learning is a learner-centred pedagogy that supports four key learner-centred principles: (a) differentiated instruction; (b) positive teacher-student relationships; (c) student choice and control; and (d) active learning. The creation of flipped learning curricular resources can require a substantial time commitment so may be a deterrent to teachers implementing flipped learning. The sharing of flipped learning resources has the potential to support teachers at all career stages to

implement learner-centred practices by reducing the time burden of resource creation. This is one of the first studies that has investigated the implementation of flipped learning by early career teachers. Further research is required to determine the utility of providing flipped learning curricular resources to support teachers to implement learner-centred pedagogies regardless of the stage of their career.

In periods of education disruption, students benefit most from teaching practices that are learner-centred. In addition, teachers adapting to teaching in non-traditional ways can benefit from the sharing of curricular resources that reduce their preparation burden. The sharing of flipped learning resources has the potential to support teachers to implement learner-centred teaching practices without greatly increasing workloads that may be already excessive.

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