Enacting a new curriculum models-based framework supported by digital technology within a learning community

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Abstract

Current cutting-edge research conveys that pedagogical change using models-based practice and integration of digital technology to enable teaching and learning is most successful when supported by a learning community. Overall, research literature acknowledges that empowering teachers to believe in themselves and their ability to tackle these new curricular and pedagogical practices is key for successful implementation. Nevertheless, enactment of a new curriculum models-based framework, supported by digital technology, has not yet been researched. Six physical education teachers with different teaching backgrounds and experience using digital technology for teaching and learning agreed to participate. Four phases were designed to develop teachers' curriculum models pedagogical knowledge and technological pedagogical content knowledge as part of a collaborative, inquiry-oriented learning community. Individual and focus group interviews, and weekly critical friend discussions were used to gather teachers' and students' perceptions of their experience. Four themes reflecting phases one and two of the data appeared and evolved 18 months later and included planning, community, student learning, and

the Phyz (app). The key take home message is the power of a well-planned, structured, and collaborative, inquiry-oriented learning community, and its impact, first, empowering teachers to enact a new curriculum models-based framework, and second, the student learning that emerged.

Keywords

Curriculum studies, models-based practice, instructional alignment, mobile apps.

Introduction

In the last few years, curriculum models (CMs) have been positioned as the radical change physical education needs to survive in the future (Kirk, 2013: Lund and Tannehill, 2015) along with the potential contribution of digital technology (Casey, Goodyear, and Armour, 2016). However, learning to teach CMs and/or using digital technology to accelerate learning in a meaningful way, is considered a complex endeavor (Casey, Goodyear, and Armour, 2017; Hordvik, MacPhail, and Ronglan, 2019). Current cutting-edge research conveys that pedagogical change in the form of models-based practice is most successful when supported by a learning community intent on improving learning across multiple domains in physical education (Casey and MacPhail, 2018). Overall, research literature acknowledges that empowering teachers to believe in themselves and their ability to tackle these new curricular and pedagogical practices is key for successful implementation (King, 2019). 'It is therefore important to understand not only the challenges and realities teachers face when they set out to implement new ideas or new curriculum, but also the ways in which they gain ownership of such ideas' (Casey and MacPhail, 2018, p. 297). For instance, barriers teachers face when teaching with CMs include difficulty learning a new way of teaching, diversification of the teacher role, and most importantly, the need for support (Casey, 2014). As Lave and Wenger (1991) reported, working collaboratively over a period of time as part of a learning community is paramount for the collective learning of people who share a concern/passion.

Fletcher and Casey (2014) highlighted that to be successful teaching teachers to teach a CMs-based approach, teacher educators should understand the problematic and complex nature of adopting innovative practice themselves. Hordvik et al. (2019) emphasized comprehensive teaching and learning experiences must be designed for physical education teachers to learn about how to teach using CMs. As such, design of challenging, relevant, and exciting learning experiences to promote student learning must be key to drawing young people into new teaching

and learning experiences where they are the central focus (Tannehill et al., 2015). Investigating how this might be done in the digital era is critical.

Digital technology for teaching and learning in physical education

Currently, there are high expectations for digital technology to optimize student learning in schools frequently reflected in educational policies and new curricula (Tondeur, van Braak, and Valcke, 2007). Making better use of digital technology for teaching and learning is one priority of the Digital Education Action Plan of the European Commission (2018). In Ireland, this plan has been implemented through the 'Digital Strategy Action Plan' (Department of Education and Skills, 2015) which had enormous implications for Irish schools and curricula. For instance, the inclusion of learning outcomes related to the use of digital technology in all subject specifications and the creation of clusters of teachers exploring effective use of digital technology for teaching and learning. However, despite promising expectations, relevant research acknowledges a need to better use digital means to reach education objectives (Casey et al., 2016), especially amidst the enthusiastic and often exaggerated terms used to discuss educational use of digital technology(Selwyn, 2016). Currently, digital technology is generating considerable interest in research and practice in physical education (Casey et al., 2017; Gard, 2014; Gibbs, Quennerstedt, and Larsson, 2016; Marttinen et al., 2019; Sargent and Casey, 2020). Bodsworth and Goodyear (2017) explored the barriers and facilitators of purposeful technology integration when using cooperative learning in physical education and found unfamiliarity with technology and poor group cooperation were initial barriers to pupil learning. They suggested action research and collaborative inquiry were critical for the teacher-researcher when learning to use digital technology and ensure technology can help students' optimal learning.

Learning to teach through collaborative inquiry-oriented learning communities

International literature in teacher education often uses learning community and community of practice interchangeably. Yet, several researchers (Goodyear and Casey, 2015; Patton and Parker, 2015) suggested that while both involve a social component with teachers collaborating and learning from one another while focused on their own needs, they are different. Hunuk et al. (2019) highlight that a learning community is a group of teachers who meet regularly to improve their own and their students' learning and through discussion, analysis, and problem-solving professional learning results (MacPhail et al., 2014). According to Wenger (1998) a community of practice reflects a situated learning model where groups engage with each other around common interests, sharing experiences, resources, and work related to their shared interest. While a subtle difference, international research suggests that collaborative, inquiry-oriented learning communities might contribute to educational change efforts (Butler and Schnellert, 2012) and are an effective form of professional development and teacher learning (Armour and Yelling, 2004; Parker et al., 2012). Several studies conducted in physical education (Goodyear and Casey, 2015; Hunuk et al., 2019; Parker et al., 2012) indicate that both are effective in supporting curriculum implementation. In collaborative inquiry learning communities, teachers work together to identify common challenges, analyze relevant data, and test instructional approaches. The idea behind this approach is that such systematic, collaborative work might increase both teacher and student learning (David, 2009). However, to promote teachers' relationships and professional learning is a complex matter. For Butler and Schnellert (2012) providing time and structured opportunities for collaboration are essential aspects to promote meaningful collaboration. They also highlighted the importance of making resources available to teachers while they are immersed in goal-directed cycles of inquiry as key to develop professional learning (Butler and Schnellert, 2012).

Theoretical frameworks

Given the social component of collaborative, inquiry-oriented learning communities, we drew on Lave and Wenger's (1991) concept of learning as a social phenomenon constituted in the experienced, lived-in world, through legitimate peripheral participation (LPP) in ongoing social practice. As we said, learning communities share a concern and learning is the reason to come together. The goal of our learning community was to learn about how to provide a meaningful and relevant teaching and learning experience while enacting a new CMs-based framework supported by digital technology. If teachers of the community can achieve this goal, learning in that sense will gain some degree of legitimacy (Casey and MacPhail, 2018). We understood peripherality as an initial way of gaining access to sources for understanding through growing involvement, but also as the different, varied, and more or less engaged ways of being located in the fields of participation defined by the community (Lave and Wenger, 1991).The conceptualization of inquiry, based on a socio-constructivist model of self-regulated learning from Butler and Schnellert (2012), also informed this study. In particular, a model of self-regulation for professional learning that involves a goal-oriented iterative cycle that includes defining problems or expectations, setting goals, selecting, adapting, or inventing task appropriate strategies, self-monitoring outcomes, and revising goals or approaches to better achieve desired outcomes (Butler, Schnellert, and Cartier, 2013). Particularly, we focused on teachers' practice-level inquiry to enact a new CMs-based framework and support student learning. Practice-level inquiry can be conceptualized as teachers' recursive engagement in planning, enacting, monitoring, and revising practices to achieve valued goals for their students and their own learning (Butler and Schnellert, 2012).

The purpose of this research was to examine through the lens of the described theoretical perspective, the enactment of a new CMs-based framework, supported by digital technology

within a collaborative inquiry-oriented learning community. This unique research focus has potential for transfer to other subjects in national and international contexts.

Method

Context

Senior Cycle Physical Education (SCPE) framework

In Ireland, the vision for Senior Cycle education is to place the learner at the centre of the educational experience with the intent of enabling learners to be resourceful and confident, able to participate actively in society, and build an interest in learning across their lifespan. Physical education at the Senior Cycle level (ages 15-17) is offered in two ways: 1) the Senior Cycle physical education framework, a comprehensive programme available to all students; and 2) as a full subject that learners study and are assessed in, as part of their Leaving Certificate examinations at completion of post primary education.

The SCPE framework provides a flexible planning tool built on students' prior learning from primary physical education and the Junior Cycle physical education syllabus. It is designed to be taught with a double-period per week at minimum. The framework is built around six CMs: (1) Sport Education; (2) Health Related Physical Activity; (3) Teaching Games for Understanding; (4) Personal and Social Responsibility; (5) Adventure Education; and (6) Contemporary Issues. The SCPE framework document developed by the national curriculum body, National Council for Curriculum and Assessment (NCCA), describes each model and its essential elements, what students will learn about, and be able to do (outcomes) as a result of engaging with and learning through each model and encourages planning for learning using the principles of instructional alignment.

The Phyz app

The NCCA put out a tender for a digital app to support physical education teachers in the enactment of the SCPE framework. The company that was successful in securing the tender consulted with the NCCA, the Physical Education Association of Ireland (PEAI), practicing teachers and physical education teacher educators throughout the development process. As a result, the SCPE framework now has the Phyz app developed as a tool to facilitate both teaching and learning as teachers and students navigate the SCPE framework. The Phyz serves as an assessment tool with the express intent of allowing students to showcase their achievement in reaching the learning outcomes identified for the CMs that make up content for the SCPE framework.

The Phyz allows students to: (1) Identify CMs and aligned learning outcomes; (2) Set goals, plan and reflect on progress toward chosen goals; (3) Communicate with their teacher, classmates, and others; (4) Construct and update a personal profile including a physical activity biography; (5) Assemble an e-portfolio; and (6) Receive prompts, feedback, and notifications from the teacher. The Phyz allows the teacher to: (1) Access CMs; 2) Select learning outcomes, plan for learning, and assessment of chosen learning outcomes; (3) Arrange class groups and subgroups; (4) Share learning outcomes, learning experiences, and assessment activities with students; (5) View students' work and provide feedback; and (6) Participate in an online learning community.

Research design

We aimed to investigate a complex, dynamic, and multidimensional phenomenon in a naturalistic setting (Yin, 2003). Therefore, a descriptive case study of one learning community of inquiry was chosen as the design for this study (Baxter and Jack, 2008). This research received ethical

approval from the authors' University Research Ethics Committee. A set of guidelines and consent forms were shared and signed by principals, parents, students and teachers providing detailed information about project goals and procedures, the curriculum framework, the Phyz, roles and responsibilities, confidentiality issues, and management and rights regarding personal data uploaded to the Phyz.

Participants

Schools and teachers

Stage one: All the schools across Ireland have previous involvement with curricular initiatives and professional development sponsored by the NCCA and/or the PEAI. The two researchers have frequently engaged with the NCCA and practicing teachers over several years on different curriculum projects. Over the past five years the NCCA and PEAI have hosted teacher workshops focused on CMs with the two researchers working collaboratively with teachers in these endeavours. Teachers who engaged with one or more of these workshops were invited to take part in this project. Six schools, their principals, and physical education teachers signed on to participate in this research project. Participants included six physical education teachers (five women, one man) with different teaching backgrounds and a variety of experience using digital technology for teaching and learning. All teachers have a teaching degree in physical education and have taught physical education from four to 24 years. None of the teachers had extensive background using technology in their teaching yet all were comfortable with the various platforms available in their schools and shared a desire to develop their skill in this area to facilitate their teaching and students' learning. Three of the teachers had previous experience of selected models from their own teacher education programmes and/or engagement with NCCA or PEAI CM workshops.

Stage two: When starting the second stage, three of the year one participating schools were unable to gain Board of Management approval to use the Phyz app with students, had no sports hall access to the Internet, or had a no phones in school policy, reducing the number of participating schools to three. In addition, one teacher overwhelmed by teaching all of the new Irish physical education curriculum developments, withdrew. Thus, participants in the second stage of the project included three female teachers drawn from phase one with four, 14, and 24 years experience, all with previous engagement with curriculum workshops through the NCCA or PEAI, and two with previous experience of selected models from their teacher education programmes.

Students

Students may spend up to three years in the Senior Cycle programme. Some students complete a 'transition year' before starting a two-year programme while others begin a two-year programme entering the Senior Cycle level. The teachers in this project all taught physical education across both the Junior Cycle (ages 12-15) and Senior Cycle levels. Each teacher chose one of their SCPE classes (transition year, 5th year or 6th year) for the project. Students who were members of the chosen classes and their parents received, reviewed, and signed permission slips to take part in the study and subsequent focus group interviews.

Procedure

Following Gawrisch, Richards, and Killian's (2019) conceptual framework for helping pre-service teachers to develop technological pedagogical content knowledge, and the practice-level of inquiry phases of Butler and Schnellert (2012), we structured the approach in four phases.

Stage One - Phase One: Pedagogical and technological content knowledge

This phase involved four face to face workshops led by the researchers and focused on teachers building their content knowledge and learning to value teaching using CMs and digital technology. Participation involved all teachers taking part in the series of workshops engaging in a collaborative way. Introduction to CMs involved: (1) teachers reviewing documents explaining the CMs; (2) discussion of how models have been used effectively by teachers in school settings; (3) review of learning outcomes identified in the SCPE documentation; and (4) brainstorming planning to use the models. Teachers were introduced to the Phyz, the teacher dashboard (what it includes and navigating its use) and the students' Phyz (resources available and engaging with the app). The Phyz introduction involved reading about CMs, listening to expert advice, 'playing' with the app, and consulting one another, the researchers and Phyz development team.

Stage One - Phase Two: Planning and enacting the curriculum models and Phyz

Researchers facilitated teachers engaging with the planning process following a template to guide development of instructionally aligned learning for students. As suggested by Butler and Schnellert (2012), teachers reviewed sample units of learning developed by the researchers to reflect the instructional alignment process that demonstrates a match between learning outcomes, teaching strategies, and assessment (Tannehill et al., 2015). Each teacher selected one of the CMs in consultation with their students, identified a learning intention for students to achieve by the end of the unit of learning, designed an assessment that would allow students to demonstrate their success, and then chose the learning outcomes they felt were critical to engage students in the learning process. Teachers then planned the selected unit of learning, working within the framework just outlined. They also considered how students might use their phones and the Phyz app to support learning in line with their school's Acceptable use Policy (AUP). Depending on school policy, students either used their own smart phones, digital devices provided to each student by the school, or worked in groups with a set of class digital devices provided for this unit

of learning. During planning, teachers worked to design teaching strategies that would allow the Phyz app to complement, enhance, and engage students in the learning process (e.g. sharing teaching resources or providing time to upload evidences to the app portfolio). Following this first unit, the learning community came together, to complete the first and second phases of inquiry by sharing their learning, planning and teaching, what they did, how it worked, reactions to the CMs and/or Phyz and sought assistance from one another for their continued work.

Stage two - Phase three: Planning and enacting the curriculum models and Phyz

During this third phase of inquiry each teacher individually planned the design and teaching of a second unit of learning using a different CM. Throughout this planning, teachers interacted with the community through the communication plan described above, gaining advice and insight from one another and the researchers. Following planning, these teachers enacted, assessed, and evaluated this unit of learning, the link with the Phyz, and assessments while seeking insights and feedback from students.

Stage two - Phase four: Showcase and revisiting of the experience

At the project's close, the learning community came together to reflect upon and discuss the experience of planning and teaching using CMs supported by the Phyz. During this showcase event the teachers, in conjunction with their students, shared their experiences, their reactions to teaching and learning, discussing the pros and cons of the CMs and the Phyz, and suggesting recommendations for moving forward both independently and/or in combination. Representatives from the NCCA, the funding body for this research, teacher educators, and graduate students with an interest in this research were invited to attend the showcase event.

Data collection

Data was collected from both the teachers and the students using a variety of methods. For teachers: (1) Individual interviews each lasting 30 to 45 minutes (initial pre-study teacher interview and following phase two); (2) Focus group (FG) interviews each lasting 30 to 45 minutes following phase two, and the closing showcase event in phase four, and (3) Weekly critical friend (CF) discussions lasting 15 to 45 minutes (the researchers were critical friend to three teachers each) during phases one, two and three. For students, four focus group interviews lasting 45 minutes (two after phase two and two after phase four). When it came to choosing students for participation in the first focus group interviews, all students were invited to take part and those who had the time available on the day the interviews were set became participants (n = 6 from each school). For the second interview, again all students were invited and those who were able to attend the showcase event were participants (n = 24).

However, the decision was made to use external reviewers for subsequent interviews. As researchers were members of the community, we felt it was not appropriate for us to conduct the final interviews as we had become so close and felt it might sway teachers and students in their responses. In addition, the final focus group interviews were conducted simultaneously on the same day as the showcase event which required multiple interviewers. One teacher educator with experience with the framework and CMs agreed to do the teacher interviews and two graduate students with experience with CMs, the SCPE framework, working with SCPE students, experience conducting focus group interviews and who were attending the showcase event were asked to conduct the student interviews. Teacher and student interviews (individual and focus group) followed a semi-structured format allowing the interviewer to ask predetermined non-invasive questions and delve further into participant answers for in-depth exploration of opinions and experiences (Table 1). The weekly CF discussions occurred by phone and aimed to create a

safe space to informally discuss with the teachers, critical incidents that happened during the week which they considered relevant to share. In order to assess the depth and quality of teachers' inquiry and of collaborative relationships, we followed the criteria defined by Butler and Schnellert (2012, p. 1217-1218).

Insert table 1 here

Data analysis

The approach to analyse the data was 'bottom up, using the participants' views to build broader themes' (Creswell, 2007, p. 23). The coding process involved three phases, initial, focused and theoretical (Charmaz, 2014) and occurred over the two stages of collaborative inquiry. Table 2 provides some examples.

Insert table 2 here

The initial phase of coding was done line-by-line and represented phrases or words drawn from the teachers and students describing the particular data to reduce researcher interpretation (Charmaz, 2014). In the focused phase of coding, themes, and subthemes were developed, and revisited through constant comparison (Boeije, 2002). In the final phase of coding, theoretical connections and relationships were made between the research goal and underpinning theory and the constructed categories. The analysis moved from inductive and descriptive (stage one) to more deductive and theory informed (stage two). The role of the teachers within the community in enacting the framework supported by digital technology, the role of the community to support the collaborative inquiry process (Butler and Schnellert, 2012), and the role of the students guided the final phase of coding. Prior to data analysis teacher and student participants had the opportunity to

review all data sources to ensure accuracy, and remove information they felt was inappropriate, or that could identify them. Pseudonyms are used throughout the paper when reporting data.

Findings

When analysing the data, the four themes identified following phase two (stage one) reappeared at the end of phase four (stage two) and included planning, community, student learning, and the Phyz app. In the second instance, the themes seemed to evolve from the perspective of the teacher and were supported by students' perspectives and experiences. From our perspective, evolved suggests progression, development, growth, and change so we have developed the themes by labelling sub-themes and presenting them in the findings to reflect this change. We share themes that evolved from project entry during phase one and to the study's conclusion 18 months later highlighting how themes played out in different phases and whether the focus was on CMs, the Phyz, or the two in combination.

Planning

The first theme, planning, focused on teachers' responses to and navigation of learning to teach using the various CMs. Two sub-themes were identified:

From teacher as planner to teacher as instructional designer

Initially, teachers viewed themselves as teachers engaged in learning about, planning for, and teaching a unit of learning using a chosen CM. During phase two, while teachers talked about planning to meet student learning outcomes and the importance of assessing student learning they did so using generic terminology yet as the study progressed, they articulated and discussed design of teaching and learning using more sophisticated concepts. Siobhan commented, 'Before I started using the CMs, I never felt like I was assessing properly. Now, I find different ways to

assess like task cards with teaching points that work well for peer assessment and feedback' (CF discussion). Early on, the teachers recognised the impact of their planning on their teaching practice. Cait noting, 'The better planned I am, the more confident I am. The more confident I am, the better teacher I am' (CF discussion) and Niamh added, 'Yeah, and the more I enjoy teaching'. Teachers discussed 'starting small' in their planning to allow both the teacher and students to gain confidence with the different CMs as highlighted by Cait, 'I think if you just boil it down to the bare minimum at the beginning, get them used to it and then once they're used to doing it you can move on (teachers' final FG).

These teachers found the CMs planning tool provided at the initial meetings to guide design of units of learning useful. Niamh remarked, 'I think the planning template really helped. Now the first day they [researchers] helped us understand how it could guide our planning regardless of the model' (teachers' FG). Siobhan added, 'Basically, it helped me determine what I wanted students to be able to do by the end of the unit, how it would be assessed and then which learning outcomes would become the focus of different lessons'.

Teachers found that their planning changed when planning for teaching using the CMs which were led by specific learning outcomes. Cait said, 'Yeah, my planning is definitely more in depth' (teachers' final FG). Niamh concurred, 'The planning was so in depth, you could really focus on the teaching and learning and having the students at the centre, definitely'. Cait concluded, 'So teaching through the CMs or positions students more centrally. It's about them as opposed to being about the activity.' By the conclusion of the project, teachers became more articulate in their interactions about the planning process as noted by the interviewer in the teachers' final FG:

> I just need to say, both of your articulation and use of language, I hope you realize that a lot of teachers don't have that articulation that you do. You know, you're talking about big picture goals, which assessments, you're talking about aligning learning outcomes,

the success criteria, that's not necessarily part of teacher's everyday talk. Do you realize that? (teachers' final FG).

Teachers releasing control

We saw this theme evolve and strengthen as teachers relinquished some control over teaching and learning and engaged learners in decisions related to their own learning, even where lessons became more structured. The teachers moved toward more collaborative teaching employing pedagogies to engage and foster students as active learners. Early on, Cait commented, 'Sport Ed is a super way of teaching. The students are really focused, and they enjoy having a role and taking charge. You can see the different leaders in the class coming out that you may not have seen as leaders before' (CF discussion). Allowing students to take charge took on more emphasis as the project progressed with one student noting, 'Miss [teacher] was very good at stepping back. She got us to take over. … she had taught us how' (students' final FG).

Teacher feedback was a meaningful pedagogical strategy acknowledged repeatedly by students. One student noted, 'We were getting feedback that kept boosting our confidence and then, through teamwork you could spread your confidence to other people' (students' final FG). Whether the feedback was verbal or through the Phyz, students found it a positive motivator and something that kept them wanting to achieve. Cait felt her teaching and interactions with students changed when using the Phyz in conjunction with a CM, 'I'd say it made me give more constructive feedback. I think when you get into Senior Cycle you are afraid to give too much feedback because they're kind of coming out to get a break. Whereas the Phyz made me think, 'Oh, I have to go in there now to see if they uploaded something to make sure I give them feedback because they're going to be waiting on me' (students' phase two FG).

Teachers were conscious of the increased structure when planning for and teaching using the CMs and indicated the impact this had for students. Cait noted, 'They know it's different. They

come in, they know our plan for the day, we'll do it, then they know we're to discuss it after. There's no shying away anymore' (teachers' final FG). Students reported how the structure of their physical education classes were completely different when being taught through the CMs which gave them more insight into what was going to take place during class and what they were expected to do and learn.

Community

From a community to a partnership with students

Since communication and group interaction are critical to learning within a community, we designed the communication plan, described previously, to engage teachers and support their work. Face to face meetings took place until the final three months of the project when due to summer break and the hectic nature of a new school year community interactions were limited to other forms of interaction in the communication plan. Niamh indicated, 'I really appreciated the WhatsApp, just being able to feed into it and getting an answer or passing it (my question) on to the developers, I think that really helped that you had constant communication lines open' (teachers' FG).

From the outset of the project teachers reacted positively to the community environment willingly sharing ideas, posing questions to one another, working together to solve problems related to their learning, responding to one another on WhatsApp, posting their planning documents to Google Drive, and engaging as a collective on any task undertaken. Following phase two Cait commented, 'Sometimes you just need to be in a room with like-minded people and the sharing just opens up. I've really enjoyed that; it has been eye opening' (CF discussion). When discussing how some of their teaching colleagues were reluctant or unwilling to share their work with others, Sinead commented, 'Why would we not share? It only makes us better if

someone is struggling, and our work helps them improve, isn't that ok? (teachers' FG). Teachers also recognised personal growth as the project progressed with Niamh noting, 'The community is brilliant. Like, every day we go there, I leave being a better PE teacher. I leave like, that's a great idea. We are just so keen to share' (CF discussion).

The community continued into phase three with the WhatsApp group, the place where teachers sought or gave assistance, vented problems encountered, and receiving support. Niamh remarked, 'While the face to face was better, given that we can't meet face to face all the time, having the lines of communication always open was good'. Niamh shared how she navigated her work during the phase three, 'With Sport Ed, I met with the other person teaching Sport Ed and we bounced ideas off each other and used WhatsApp to clarify' (teachers' final FG). Cait added, 'the Google Drive with our shared resources helped me a lot' (teachers' final FG). Overall, the teachers were able to support one another through various communication strategies.

While the community continued during phase three, the researchers noted the relationships developing between the teachers and their students (CF discussions). A teacher-student partnership evolved with teachers inviting student engagement in teaching and learning decisions, giving up some control, permitting students to negotiate aspects of the learning process, or merely hearing about students and teachers interacting with one another in a more collaborative way. In addition, a student-student partnership emerged and was supported and encouraged by the teachers. One student said he learned 'teamwork is really the key to everything… I have to include Miss [teacher] in that too as she treated us like her team' (students' final FG). As part of teamwork, there was discussion on the improved communication that came from working with peers, 'By the end of the whole curriculum, all of us were communicating, even though we haven't known each other before. We might have not necessarily spoken to each other but now we can' (students' final FG). It was interesting to see how the students credited the Phyz for increasing their relationships with each other and their teacher. They talked about the bonding that took place

as together they navigated learning what the Phyz could do and how they would use it to provide evidence of their learning. One student indicated, ‘we got to know each other’s strengths and weaknesses and even how we might help each other’ (students’ final FG).

Student learning

Teachers and students both shared their perception that the learning that took place throughout the experience with the CMs and Phyz was exciting and challenging. The theme student learning evolved over time as students began to focus on self and taking ownership of their learning experiences, consistent with the SCPE framework which places the learner at the centre of the teaching and learning process. The CMs because of their nature and philosophical perspective, also focus on the learner as opposed to being teacher centred and directed. Cait remarked, ‘I think in PE now students feel like they're supposed to be learning and they want to learn more’ (teachers’ final FG). Niamh added, ‘yeah students have learned to know what they should know and they’re able to work with it themselves’. This notion of being learner centred with a focus on learning was important to these young people as well; it was about them and their personal development. One student commented:

> I really liked the real-life aspect. She gave us some ideas. We had group discussions before and after class to make sure everybody was okay with what we were doing and felt comfortable, competent and we had fun with what we were doing, they were our activities (students’ final FG).

One student linked his awareness of self to a learning experience within the Phyz that he linked to his improvement and goal setting.

> I was using an option Miss [teacher] put on the Phyz of learning for rugby. I was watching a few videos, how they passed, what they do, how they move. That helped me

> to improve myself. I used the ‘me’ activity on the Phyz to set my own goals and activities and how to improve (students’ final FG).

It was exciting to see the teachers respond to their students’ engagement with and ownership of learning. Niamh noted:

> I learned that the students are able to own their own learning, and teaching. Before this I was very skills driven, and I was the teacher, they were the student. I planned, they did it, we played a game at the end, same next week when we moved on to the next skill. In both Sport Ed and TPSR [Teaching Social and Personal Responsibility], I learned that they can run it nearly better than I can (teachers’ final FG).

Teachers noted that these young people relished the opportunity to take responsibility for their own learning and engage in decisions that impacted that learning. Whether just focused on the CMs, the Phyz, or the two aligned, student perspectives highlight the ownership they began to take for their own learning. During the students’ final FG when discussing their engagement in the class and taking more responsibility, one student noted, ‘Especially for seniors like us. Like you're becoming a mature adult, like if a teacher’s always going to tell you what you're doing, like how are they preparing you then for college where you're out on your own?’ and another commented, ‘Miss [teacher] let us make our own decisions on what we wanted to do and the curriculum helped you realise that’. When discussing using the Phyz to provide evidence of learning one student suggested, ‘when we have to upload our pictures after every class to get feedback it makes you more responsible. If you forget, it will be your problem’. A student who was particularly engaged with designing and following her food diary on the Phyz indicated:

> The food diary, normally you're not conscious of what you eat. When you're writing it down you become conscious of what and how much you eat, and it tells you how much in a day you can have. If you need to change, say intake more fruit and veg and less sugary foods and stuff like that...it’s right there for you (students’ final FG).

During the final focus group, teachers shared a highlight when teaching using the CMs. Cait shared, ‘I think probably the goal for me is seeing that they're going home after HRA [Health Related Activity] and actually doing activities from class. They were comfortable telling me about going outside their comfort zone when leaving school’. Cait noted, ‘It is them [students], they're learning for themselves. They realize now that it's not just you teaching a class, you're teaching them for life … that was a big deal when they realized it. It’s about them rather than being about the activity’.

Students’ discussion during the final focus group highlighted teamwork, improved communication, and gaining confidence in themselves and their abilities as key aspects of what they learned from engaging with the CMs. One student, when discussing a HRA unit commented, ‘It's all about physical health but you know... like the food diary, when we went home we did what we had in our diary. So, that benefits us inside the PE class and outside for both our mental and physical health’. Another student shared:

> I started going to the gym. We started the Phyz and I was kind of like, oh I need to be a bit more active. I would go to the gym three times a week just because of the Phyz. It was the tracking of your activity on the Phyz that did it. I was realizing that people were doing stuff every week and I was like, all I do is PE. I was kind of thinking should I step it up just for myself. It did motivate me to do that (students’ final FG).

The Phyz

The issue seemed to be teachers moving from figuring out what the Phyz can do, to determining how the Phyz can enhance teaching and learning. Since the Phyz was only in a developmental phase (beta version) throughout this project, it caused a number of issues with timelines set for project goals. However, it did allow teachers to focus on the CMs. Cait remarked, ‘I think the delay worked in our favour and made us realize that the CMs are actually more important than the

Phyz' (teachers' final FG). Once the Phyz was released to us, it was difficult for us to remember we were trialling it and giving feedback for revision rather than working with a fully functioning and complete app. This caused frustration for both the teachers and the students as problems with the Phyz were identified:

> I discovered the students found a lot more problems, sometimes just from experimenting with it. I created my own student profile to make sure I was sending stuff right and that I was doing things, because I feel like sometimes, you're like, 'Oh you can edit this,' and then they're like, 'No, Miss, you actually can't.' At the same time, students found things that they could do that I was unaware of, like setting and monitoring goals' (Cait, teachers' final FG).

Despite the problems that were encountered, the teachers did note students were excited and interested in engaging with the Phyz and were the best judges of what was useful. Cait indicated, 'I think they're more excited, aren't they? They seem more engaged in wanting to learn in PE and they want to show that they can assess and are doing things' (teachers' final FG). The students' story in learning to use the Phyz is more positive than the teachers', perhaps due to their having grown up with technology in ways teachers have not. One student shared, 'I was worried we would be writing all the time and it would take the fun and the relaxation out of PE but actually it didn't, because it was in the Phyz, it was actually good' (students' final FG).

After they completed a unit of learning that engaged them with the Phyz to document their learning, comments were positive and included constructive feedback on how to improve the Phyz. When sharing what they saw as a place for the Phyz in their education, these young people were adamant that it was essential to their learning, 'it should be rolled out in everything', 'it should be fair… all students should have the chance to use it', 'and, in more subjects as well'. One student emphasised, 'Especially nowadays with everyone having a smart phone, it only makes sense that education starts jumping on it' (students' final FG). Another student excitedly said,

‘Once again if it was made to its full potential and everyone was shown how to use it, that would be like, ‘Oh my God, this is amazing’ (students’ final FG).

Interesting to note the importance these students placed on the CMs and the Phyz being taught simultaneously. An exchange among a group of students in the final focus group highlighted their perspectives. One student noted, ‘I really enjoyed the CM, the in-class stuff. I really preferred that surprisingly, I loved being in class but if the Phyz was taken away, I think it would take away from the experience. And the other way around as well’. Another student remarked, ‘We do things in class that are complemented by the Phyz’. A peer summed up, ‘I suppose if you're learning something in class and then you go home and Miss [teacher] may ask us to assess it using the Phyz, you know then you're actually learning something more from the class because you remember it then’.

In conclusion, at the end of the teachers’ final FG, the interviewer asked the teachers to share a meaningful personal incident about the project and Cait responded:

> Yeah. I'd say it's just refreshing when you hear the students talk so positively. You don't think you're having that massive effect on them, and then when you come to a situation like this event today where they are in their group interviews, and I was just blown away by them. The way they're able to articulate themselves and you recognise you've really taught them something. Planning and teaching with the CMs and Phyz, it has rejuvenated my teaching’.

Discussion

In this research we examined the enactment of a new CMs-based framework, supported by digital technology within a collaborative, inquiry-oriented learning community. Enacting the new curriculum was a dynamic and multifaceted process that required teachers making decisions to adapt the curriculum to meet the needs of their local context (Whittle and MacPhail, 2020) in a

549 way that provided success for each individual student (Simmons and MacLean, 2016). However,
550 despite this challenging process, we witnessed a successful professional learning experience,
551 where teachers involved their students (and themselves) in a learning process that took them
552 beyond what they had experienced previously (Armour et al., 2017).

553 Teachers acknowledged how their planning changed as a result of a focus on student
554 learning, specifically the learning outcomes identified for the various CMs. This change was
555 supported by the SCPE framework document, which guided their work and the materials provided
556 to teachers during initial community meetings. When coming to the close of the study, teachers'
557 insight on how their planning changed to focus on students and their learning following the tenets
558 of instructional alignment as described by Tannehill et al. (2015) was noteworthy.

559 Casey (2014) suggested that teachers learning new ways of teaching is important if they
560 are to promote student learning. These teachers' role changed as they progressed through the
561 project, with their designing teaching and learning differently than they had previously. This
562 change is in line with the literature which speaks to the complex nature of planning and teaching
563 using CMs-based practice (Fletcher and Casey, 2014) and the need for teachers and teacher
564 educators to become familiar with innovative practices to enhance teaching and learning (Hordvik
565 et al., 2019). One key point for these teachers, was their willingness to give up some control over
566 the teaching and learning process and inviting students to share some of the teaching decisions,
567 and the ways in which they participate.

568 Students began to realize that learning, not just activity, is intended to take place in physical
569 education and that they were partially responsible for that learning. Engaging young people in
570 learning, where they are central to the teaching decisions made and where their views are valued
571 and used to design learning experiences, is important to their learning (Tannehill et al., 2015).
572 These students began for the first time to take ownership of their experiences, responsibility for
573 their own learning, and they appeared to relish their new role. Given the recursive engagement in

cycles of inquiry and its phases (Butler and Schnellert, 2012), teachers responded to this new motivation and drive of the students, even suggesting that as a result, they gained a new appreciation for and desire to teach physical education.

Throughout the project and as teachers navigated design and teaching of a new curriculum where they took on a more open, sharing role with their students, teachers recognised being more encouraging and supportive of their students in their learning and development. This supports guidance from the SCPE framework, that emphasises engaging students in decisions involved in the teaching and learning process. These teachers talked about a growing sense of empowerment, more confidence, and becoming better teachers as a result of sharing teaching decisions with students (King, 2019), which also reflect the legitimacy and peripherality of their learning (Lave and Wenger, 1991). As they enjoyed the teaching experience, they realized that it is not what they, as teachers do, but how students are engaged with their own learning.

Community was an important aspect of this research. Consistent with Casey and MacPhail (2018), teachers engaged in curricular change are most successful when receiving support from a learning community. Teachers ability to negotiate new curricular and teaching strategies within a collaborative inquiry community context requires planning ways for teachers' communicating and interacting. These teachers acknowledged the importance of working together, sharing ideas, and seeking assistance from one another throughout the project, which again reflect the learning that occurred as a social phenomenon through legitimate peripheral participation (Lave and Wenger, 1991). The depth and quality of the inquiry and the collaborative relationships (Butler and Schnellert, 2012), showed evidence of purposeful planning (e.g. when Cait planned to address students' issues with the Phyz), and evidence of collaborative reflection (e.g. when Niamh met with the other teacher teaching Sport Education to share thoughts and difficulties). There was also a sense of working together to implement, adapt and refine practice related to goals, co-planning with learning outcomes in mind, and collaborative development of teaching strategies and

599 approaches. Key for these teachers was the communication plan that allowed on-going and
600 frequent exchange resulting in their taking ownership of the new models-based curriculum they
601 were introducing in their physical education programmes (Casey and MacPhail, 2018).
602 The prospect of teaching with the Phyz has instigated excitement from physical education
603 teachers across the country. When the project began, teachers thought the Phyz might actually do
604 some of the teaching for them rather than as a tool that could enhance both their teaching and
605 student learning. They had an exaggerated view of what the Phyz was and what it could do
606 (Selwyn, 2016). Having the Phyz in a developmental phase, was perhaps a bonus for teachers
607 trying to learn how to use a CMs-based format in conjunction with the Phyz. Being forced to learn
608 the CMs first and then being introduced to the Phyz, allowed teachers to understand the role of the
609 Phyz and how it might enhance their pedagogical decisions (Mao, 2014). Like Bodsworth and
610 Goodyear (2017), these teachers identified some of the barriers they and the students encountered
611 when attempting to teach and learn through a new technology. Accordingly and also prompted by
612 the inquiry nature of their learning process, they came to the conclusion that the CMs and the
613 Phyz need to be learned and taught separately and then integrated.
614 From the first day of the project, teachers found the students eager to engage with the
615 Phyz, to play with it at home, and highlight issues they found with its use. While a few students
616 voiced concern that the Phyz might take away from their level of activity in physical education,
617 ultimately, they found that in some ways it enhanced their participation, especially outside of
618 class. Students' input throughout the project was critical to identifying ways to integrate the Phyz
619 appropriately to enhance their learning (Sargent and Casey, 2020). It was interesting that these
620 students saw the link between the CMs and the Phyz, suggesting that both were crucial to their
621 learning. They liked the way the Phyz allowed them to interact with the teacher, around what and
622 how they were learning in class. Students' growth in terms of ownership and responsibility is
623 evident in the findings, for example, as they uploaded pictures after every class to get teacher

feedback or when reflecting on the mental and physical benefits of HRA. Based on students' positive reactions to and perceptions of the use of technology combined with CMs, we concluded a motivational effect in line with recent research by Marttinen et al. (2019).

It has been argued that 'digital technologies have the potential to make physical education relevant to contemporary youth, but only if we are willing to alter our content and pedagogies to meet young people where they are, rather than where they used to be' (Armour, Goodyear, and Sandford, 2020, p. 100). Our research supports this idea and provides some evidence about how the teacher-student and student-student partnership, was paramount and important to negotiate learning aspects throughout the 18-month project. It is important to note however, that there were many technical problems that blurred the pedagogical ones (Gard, 2014). In our study, teachers had to 'fit the Phyz in' sometimes, particularly in phase two to suit variables such as the needs of the students and the expectations of various stakeholders (Cartwright and Hammond, 2007).

Conclusions and recommendations

Conclusions and recommendations drawn from this work were drawn from and discussed with the teachers, researchers, students, and other stakeholders attending the final showcase event. It is our belief that the points highlighted are key for consideration when implementing a new and innovative curriculum.

The most significant conclusion drawn from this research is that teacher engagement in a learning community was paramount to these teachers' development of effective practice when designing and teaching a models-based curriculum enhanced by digital technology. Access to and involvement in the community is credited with teachers' perceptions of improved planning, relationships with students, feelings of self-worth, more effectively facilitating student learning, and being better teachers. The teachers' ongoing interactions and cycles of inquiry within the community as a means to change pedagogical and interactive practice, were key to their growth as

teachers and change agents. As a result of these, teachers' acknowledgement of the importance of community, one of our recommendations is that initial teacher education and professional development initiatives for the new SCPE framework, and other CMs-based frameworks, be designed through a learning community format.

As we previously reported, upon entering the third phase of the project we lost three of our schools, due to their inability to gain Board of Management approval to use the Phyz with students, had no sports hall access to the Internet, and/or had a no phones in school policy. As a result, we learned that enacting a new curriculum framework requires commitment, not just from the teachers, but from school administration, and students. Like other innovative approaches, curricular change requires a mindset change (Ng et al., 2019). A mindset change requires all stakeholders to consider how we think about teaching and learning, how support is provided, how resources are distributed, how to work collaboratively on a whole school level, and how to interact with students to involve them in learning. Drawing on the work of the Active School Flag initiative (Ng et al., 2019), we suggest that success in the change process, requires all stakeholders being ready to engage in change; prepared and willing to do what it takes to make effective change happen. This notion of readiness to engage needs further study and will shed light on the complexities of enacting new curricula and the pedagogical use of digital technology in physical education. This was a tough lesson to learn and one that has implications for all subject areas seeking to add any kind of mobile app or digital technology to enhance teaching and/or learning.

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