

## **Experiencing new technology: exploring pre-service teachers' perceptions and reflections upon the affordances of social media.**

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### **Abstract**

This paper analyses pre-service teachers' perceptions of the affordances of new technology after experiencing two social media tools embedded into their coursework. This sociological ethnographic study builds upon previously gathered data that highlighted that 72% of pre-service teachers in the Masters of Teaching degree use personal mobile devices. Personal technology use was high, and the previous survey demonstrated that participants held a positive outlook for technology use in their future classrooms. However, these pre-service teachers had difficulty in articulating an educational vision for this technology. This study draws upon data from 120, second year Masters of Teaching pre-service teachers. Our focus, as academic staff, was to provide opportunities for all pre-service teachers to meaningfully experience the possibilities for learning spaces offered by new technologies. We scaffolded learning opportunities for pre-service teachers into lectures and workshops focusing on two social media tools: 'Edmodo' and 'Twitter'. Participants were surveyed prior to their experiences, and their written reflections on the affordances of 'Edmodo' and 'Twitter' at the end of the semester were also coded. Personal mobile device use in this group increased, with more than 80% having a smart phone, and also at least one other personal mobile device (i-Pod, Laptop, i-Pad). Data displays a shift in pre-service teachers' perceptions of future use of these technologies within their own classrooms. Their reflections on 'Edmodo' and 'Twitter' show a refined ability to identify the possibilities of both tools, with many respondents providing a new and favorable vision for using of at least one of these in their future primary classroom practices. This study also outlines for us 'where to next' for pre-service teacher preparation for teaching 21st century skills.

### **Introduction**

Technology use in classrooms holds great promise for our students to experience 21<sup>st</sup> century skills (Dede et.al, 2005). A survey of 108 pre-service teachers in 2011 found that while many (72%) held a positive view of technology use in their future classrooms, only a small percentage (16%) had a view for uses that involved the creative and collaborative potential of technology (Redman and Trapani, 2012). Redman and Trapani concluded that further meaningful personal learning experiences needed to be provided to involve pre-service teachers in using new technologies for their own learning. Edmodo and Twitter were chosen as the specific new technology tools for the pre-service teachers to experience as both promote communication and collaboration. A survey of the 2012 cohort (125 pre-service teachers) was conducted to ascertain personal technology use and visions for future classroom use before involvement in the social media experiences. At the end of the semester pre-service teachers were asked to review and reflect upon the uses of Edmodo and Twitter in their future classrooms, this generated 85 responses. The following paper analyses the perceptions of the pre-service teachers before and after these experiences, with a view to informing our teaching next semester to further support this cohort in developing pedagogy that encompasses social media and other new technologies.

The affordances of new technologies include the ability to situate learning to encourage the

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development of 21<sup>st</sup> century skills. Dede et.al (2005) outlines the types of learning situations that can support the development of these skills. They include: for students to have a fluency in multiple media, to be involved in learning that is active and based upon experiences that promote reflective opportunities, and the ability to co-design personalised learning experiences.

Our approach, and thinking, about how to utilise new technologies had been informed by research indicating that in higher educational settings students sometimes find using new technologies for learning challenging (Kennedy et al, 2006; Oliver and Goerke, 2007). These reports state that students are familiar with new technologies for many purposes, but have less familiarity with using the tools for enhancing their learning outcomes. As our students are in the process of becoming teachers the tools we choose were ones that would assist them now, as learners of science, and also modeled pedagogically approaches suitable for use as teachers in the future.

We sought to establish interactions between our students and the tools that had clear goals and purposes for learning about science. The objectives were explained and made explicit to the students (Leontiev, 1978/2000). A pedagogical framework that valued dialogical learning experiences informed the goals we had identified. We had sought to embed these goals strategically to both support the development of science understandings and develop a community of learners. These goals also informed the selection of the technology tools. We had opted for ones that offered our students, as learners, the opportunity to be actively constructing, and sharing, their understandings (Vygotsky, 1978; Wertsch, 1991) based on their science experiences. The tools were chosen to draw the individual, and their private outside science experiences, back into the shared and public space, and to support more social and dialogical learning, through communities of practice, (Lave and Wenger, 1990).

The students were introduced to a form of Twitter, called Today's Meet. It is similar to Twitter, and can be described as a micro-blogging tool, limiting the text to 140 characters. We introduced it into a setting that was focused on supporting the students to construct their science knowledge, using a collaborative and guided approach (Mercer, 1995). The pedagogical framing of the use of a Twitter like tool had been designed to provide an opportunity to create a learning space suitable for communicative practice (Kramsch and Anderson, 1999). Twitter was used in a lecture setting, enabling participants to contribute, and ask questions, as the need arose. The students will be teachers of science, and this approach was aimed at improving their ability to communicate their science ideas, from their recent experiences with science experiments. Our goals were to support the student's abilities to explain their science understandings and their capacity to explain their understandings to others (Sutton, 1996).

The principles of Twitter were maintained, but the use of Today's Meet had allowed us to modify and limit the use of the on-line site to our participants. We also used an adapted version of what is currently termed the Flipped Classroom. The key elements of the Flipped Classroom are succinctly described as 'collaboration, inquiry and interactivity' (Pappas, 2012). The students have opportunities to become active learners and they are supported to focus on their specific learning needs.

The Flipped Classroom often refers to the use of resources, like informative videos, that can be used

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outside the classroom that may then assist to students work more at their level of need in the classroom. In the most common use of the model of the Flipped Classroom students often do the reading or background work at home and then return to the classroom to complete the activities, supported by their teachers. In this study, our pre-service teachers were invited to select from a list of fifteen science activities that were then conducted at home. Our students observed the outcomes and then identified the key science ideas in the activity and an explanation that could be shared in the lecture setting.

In the lecture time, students could then log into Today's Meet, and post brief Twitter-style comments and questions. The experiences were provided to support our students to share their science experiences with each other and to create a community of learners, through this shared practice (Lave and Wenger, 1990). Some students discussed their experiences, and as they did so students who had also conducted the activity could post their comments on their experience simultaneously. Other students could post questions, and these could be answered by anyone, either by discussing it, or posting an answer. The students were exploring their science activities, language and understandings. But, together, we were evaluating the pedagogical contribution of the twitter-style back channel as a possible learning tool for the classroom. Was this a tool that promoted thinking, discussion and sharing of ideas, and could it effectively support the use of questioning and feedback in the classroom (Wolfe and Alexander, 2008)?

Edmodo was introduced to support in class, and outside communication and collaboration spaces. The students took up Edmodo 'student roles', and over several weeks used the space as a student in their classroom might do. They worked in their workshop groups, but they had access to the other five workshop groups. Then students were introduced to the role and features that a teacher has in the Edmodo space. The access and use of Edmodo was staged and sequentially developed, week by week. In the first weeks logging in and making comments was supported, then the uploading and sharing pictures and videos was developed, and added to their skill set. The use of the Edmodo tool was supported and encouraged in the workshop groups. No marks were allocated to the use of Edmodo. It was set up as a play space, to be explored and evaluated for its contribution as a learning space.

## Methodology

In the first lecture session of the semester a one-page questionnaire was distributed to second year Master of Teaching students. Participants were not required to name the sheet. In total, 125 pre-service teachers responded. The questionnaire served two purposes, first to locate the current perceptions of students about their personal technology use and, second, to inform our pedagogy to better support pre-service teachers to use new technologies. The first 3 questions on the survey asked for personal technology data: what sorts of devices pre-service teachers had and how they were used. This data was then compared to the data collected in 2011.

The next four questions probed the pre-service teachers perceptions of how new technologies have supported their own learning and teaching goals. The written responses to these four questions were coded to reflect the past and present use of new technologies in classroom teaching. Directly following this were two questions that focused on professional practice and the vision they have of using either

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games or new technologies in their future classrooms. The pre-service teachers' responses were grouped using Bloom's revised taxonomy (Anderson & Krathwohl (2001). The final question asked directly if pre-service teachers had used Edmodo, this wasn't asked in the previous year and helped to set a baseline for the experiences throughout the semester.

During semester 1 particular attention was given to structuring learning experiences that utilized two social media tools, Edmodo and Today's Meet (a version of Twitter). This included tutorial sessions, with 24 pre-service teachers in each session, where Edmodo was modeled and then used by pre-service teachers over a number of weeks. The second group experience is described here as a 'flipped lecture' (125 pre-service teachers) that utilized Today's Meet to generate discussion. At the end of the semester pre-service teachers were invited to submit a written reflection on how they envisioned the two tools could be used in a classroom situation. Reflections were submitted by 85 pre-service teachers, and were coded to reflect the affordances, and pedagogical visions, of the pre-service teachers.

## Results and Discussion

Table 1 below displays data from question 1 of the questionnaire for 2011 co-hort (Redman and Trapani 2012) and 2012 co-hort. The questionnaire was given at the conclusion of the last semester of study in 2011. In 2012 it was administered in the first session of the first semester. In terms of personal mobile device ownership the comparative percentage of pre-service teachers with smart-phones and i-devices seems to be lower. The laptop and 'other mobile device' comparative percentage are higher, with some pre-service teachers adding the comment in this section that they have alternative tablet mobile devices to the i-devices. Interestingly the data shows that most pre-service teachers have personal ownership of at least one mobile device, if not two. This data suggests that perhaps the market is changing and despite the pre-service teachers not having the same types of mobile devices, they are finding and accessing the mobile devices that work best for them. It could be assumed from this data that the vast majority of pre-service teachers in the 2012 cohort have at least basic skills for using and navigating mobile devices.

Table 1: Personal technology ownership. (Do you have a...(type of mobile device)?)

### *Pre-service teachers responses from 2011 and 2012.*

Mobile Device	2011 (108 participants)	2012 (125 participants)
Smart-phone	89%	75%
i-pod touch/i-pad (i-devices)	30%	26%
Laptop	82%	91%
Other mobile device	16%	19%

Table 2 outlines the uses of the mobile devices in 2011 and 2012. Percentage data was calculated using the number of participants who owned that particular device, for example of the pre-service teachers with a smart-phone, 82% use it to access Facebook. This data was compared with that from 2011. There is a clear increase in pre-service teachers accessing Facebook, Twitter, and Applications (Apps) from a range of devices. The only decline is email access from a laptop, and as table 1

indicates, many pre-service teachers have more than one mobile device; perhaps emails are being viewed on other devices, as there is a sharp increase in pre-service teachers reporting access to email via smart-phones and i-devices. This trend supports a hypothesis that more pre-service teachers have knowledge and skills to utilize a variety of affordances of these mobile devices in their personal communication and for entertainment/information (Apps). The increase in the percentage of pre-service teachers accessing Apps to 100% in 2012 is somewhat misleading, due to the operating system of i-devices, all functions including email, web browsing and Facebook are packaged and accessed via an 'App', and so perhaps what we are witnessing is a shift in pre-service teachers understanding of the terminology used in this particular operating system.

Table 2: Personal technology use. (Do you use your mobile device for...?)

*Pre-service teachers responses from 2011 and 2012.*

Mobile device	Facebook		Twitter		Email		Apps	
	2011	2012	2011	2012	2011	2012	2011	2012
Smart-phone	64%	82%	7%	12%	65%	70%	68%	87%
i-pod/i-pad	40%	59%	3%	6%	31%	72%	78%	100%
Laptop	76%	93%	5%	10%	91%	73%	35%	37%

The pre-service teachers' favorite uses of their mobile devices are recorded in Table 3 below. While we asked specifically about SMS, Email and Apps, the pre-service teachers also added comments to this data that included uses of their devices (Table 4). These uses range from simply viewing/consuming information, to interacting with and creating new information to share with others. Table 3 shows a rise in favoring smart-phones for email access, and a slight decline in favoring laptop access to email. It is unclear whether the pre-service teachers like writing emails on their smart phones or just reading email while on the move. What is interesting to note here is the drop in email access from i-devices, and it is unclear why this may be the case. Our hypothesis is that it might be the omnipresent feature of the smart-phone that is due to its ease of mobility.

Table 3: Personal technology favorite uses.

*Pre-service teachers responses from 2011 and 2012.*

Mobile device	SMS		Email		Apps	
	2011	2012	2011	2012	2011	2012
Smart-phone	72%	95%	40%	51%	29%	17%
i-pod/i-pad	3%	13%	47%	13%	15%	28%
Laptop	7%	7%	79%	74%	6%	4%

Table 4: Personal technology favorite uses.

*Pre-service teachers written responses to question 3 from 2012.*

Bloom's revised taxonomy	Remember	Apply	Create

<p><b>Favorite uses stated by pre-service teachers.</b></p>	<p>Reading blogs, books and documents                  Checking weather                  Tram Tracker                  Podcasts                  Music                  ABC news                  Internet                  TV/movies                  Photos</p>	<p>Maps                  Games                  Surfing the web/internet                  Calendar                  Words with friends                  University work</p>	<p>Camera                  Photo editing                  Recording                  Games                  Banking                  Facebook                  Calls                  Internet</p>
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In summary, the answers to the first 3 questions reflect the participants' everyday use of mobile devices. Participants are developing skills to meet the personal demands of their everyday lives. They are aware of and utilise the affordances of these mobile technologies to communicate, connect and share ideas, photos, locations and events within the social community. The next questions sought to find out if they are transferring their understandings of these affordances to their classroom practice.

### Participants' perceptions of the educational affordances of new technologies

Pre-service teachers' responses to the next four questions illuminated their past and present experiences of using new technologies, within their own learning, and also in their placements, in classrooms. The data displays a range of uses and an awareness of affordances of the new technologies available in classrooms settings. The most common response (46%) was the use of the Internet for students' research and their own lesson planning, with participants stating:

*Lets them discover new ways to research and present data;*

*Internet: unbeatable source of lesson ideas and educational definitions and journals. More confident about a teaching future with few limitations on resources and information.*

With 23% of participants using Interactive White Boards (IWB) to support classroom interactions, it appears that pre-service teachers are beginning to develop personal pedagogies that support them to embed technologies into the classroom. More pre-service teachers in 2012 were able to extend their response from 'engagement' and 'motivation' to provide reasons:

*Educational apps that present information in an engaging way (flashy examples, moving diagrams);*

*Teaching more effective, immediate and relevant to today's students by availability of technology.*

Using Blooms' Revised Taxonomy (Anderson & Krathwohl, 2001) and coding against higher cognitive skills, 13% of participants identified that using new technologies would promote student communication with the wider world and a further 13% expressed a desire to support students to use new technologies to reflect upon their own learning and collaborate on tasks with others. One pre-service teacher stated:

*As a teacher, we want our students to be best equipped for the future. Incorporating such*

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*technologies into the classroom ensures that such a vital part of our society is being included in schools education.*

There are still reservations about technology not working in some settings. However there is awareness indicated in the data that a backup plan always needs to be in place:

*New technologies should be an important part in classroom, but will always have a backup non-technologies plan.*

5% of respondents also indicated they had used their own mobile devices to achieve what they planned within a classroom setting. Three students explicitly stated that they lacked confidence with new technologies and needed more training.

In reflecting on the impact of new technologies on their own learning the pre-service teachers expressed a variety of positive affordances, including that it is fun, relevant and engaging for them (15%) and that it assists communication and collaboration on tasks. Most readily the pre-service teachers identified their use of the Internet was mainly for research purposes (42%), with the majority stating at least one additional affordance. This is possibly indicative of an increase in personal use to produce and collaborate towards using higher order thinking tools/skills.

Question 6 and 7 asked pre-service teachers to identify their favorite educational Apps and games respectively. These were coded into the following categories: rote/repetition, consolidation/extension and creative/higher order thinking. The majority of responding pre-service teachers were able to list approximately 5 apps/games they had used. The data shows a high usage of rote/repetition apps, especially in numeracy (15%) and literacy (15%) and rote/repetition web based games, numeracy (26%) and literacy (17%). Less than 10% of responses indicated Apps and games being used for consolidation/extension work. Only 2% indicated Apps and games being used for creative/higher order thinking tasks, these examples were Garage band (student creating music via IWB) and a strategy game called 'cut the rope' on the IWB.

The data indicates that pre-service teachers are probably expecting to develop their own skills for using new technologies and many are implementing these into their classroom practice. As they are progressing in understanding and pedagogy for technology tools, it is expected that some are further along in this journey than others. This is reflected in the data from the next 3 questions that probed the visions the pre-service teachers have for these technologies in their future classrooms.

### Participants' visions of the educational affordances of new technologies

The responses indicated that 64% of participants had a positive vision of incorporating rote/repetition type games and new technologies into their own classrooms. They viewed this as a way of engaging students in developing literacy and numeracy skills. A further 35% anticipated incorporating these features but didn't define an application/game or technology that may assist them:

*Teach through games. Students shouldn't feel that there is a difference between learning and having fun,*

*Use games that will clearly help students reach learning outcomes,*

*As a way of learning without 'knowing', to make school time more dynamic and fun.*

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Only 10% of participants expressed a vision that indicated that it encompassed creative or collaborative opportunities for their students, for example:

*Games that can be really engaging and challenging but can be calibrated for student needs,*

*Games teach students how to problem solve and equip them with skills needed,*

*Collaborative opportunities, giant sandboxes with student led direction. Games such as Minecraft may be perfect for this.*

There was a small percentage (6%) who stated they still needed help and had concerns:

*Don't want to rely too heavily on them, as it will make my position redundant,*

*When I can understand and use them I will use them in the classroom*

The final question asked if students had used Edmodo. Only 5 pre-service teachers responded to this question. Of these, one had used Edmodo and the other responses outlined an understanding that this social media tool would assist in sharing ideas, engaging students and potentially allow a 'flipped classroom' situation.

These responses indicate that there are a portion of our pre-service teachers who look to new technologies favorably. They are aware that the affordances of games and new technologies include students centered, personalized learning environments, where learning can be focused and fun. It also indicates that more structured interactions need to be modeled and experienced by the pre-service teachers to enable them to develop a wider vision of the potential of these tools in their classrooms today.

## Participants' experiences of new technologies: Using Edmodo and Twitter

In the majority of the 85 written responses submitted, the pre-service teachers reflections displayed a balanced overview of the educational affordances of both of these tools. With reference to Edmodo, they cited their own experience and were able to reflect upon potential for students to experience success:

*Edmodo is engaging and motivating for students,*

*A safe space/controlled environment and could enable peer tutoring,*

as well as the potential classroom obstacles:

*Students may feel left out if they don't have Internet access at home,*

*Younger students may not have the ICT skills to use this tool.*

All respondents could see a place for this tool in their future practice and articulated the use of this in a variety of ways. For example 71% of respondents saw great promise in the social networking and communication aspects of Edmodo, using key words: live, fun, share ideas and display work. The next most stated use (56%) was for purposes that involved collaboration and creative interaction of

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students. 40% saw a great opportunity for students to reflect and have a voice within the classroom while 35% expressed that Edmodo would provide an authentic out of class experience, and allow parents, students and teachers to work together. A further 25% of participant responses identified the ICT and multimedia skills that the students would be able to develop by sharing photos, links and videos through this site.

The pre-service teachers were very positive about Edmodo and all respondents articulated a vision that incorporated Edmodo use into their future classroom practice. They saw it as a teacher regulated space that promoted positive and safe learning experiences for the students. In addition it had potential to provide opportunities for wider community links and involvement in collaborative and creative projects for their students. That the pre-service teachers articulated this potential for projects that develop higher order cognitive engagement indicated that they are reflecting upon the affordances they experienced in their semester's classes. This experience has promoted thinking, discussion and sharing of ideas amongst the pre-service teachers and their responses suggest they are developing their pedagogy to support the use of this tool in their classrooms.

The pre-service teachers' review of Today's Meet was equally balanced, with potential for success and classroom obstacles presented. One pre-service teacher stated they had used it with a class and found that it helped collaboration with the students. More generally pre-service teachers could see the potential for Today's Meet to enable discussion, collaboration and to make more learning visible (64%):

*I found that it was very engaging today,*

*It enables all students to feel heard*

*Monitoring understanding of a whole class*

*Allowing student voice to drive discussion in a meaningful way*

Today's Meet was recognised as providing an opportunity for student voices to be heard, increasing participation, good for visual learners, 'shy kids' and English as a Second Language (ESL) learners (58%). Only 12% of pre-service teachers commented on the ability to share links or pictures with others.

Accessibility was presented in contrasting ways, some held concerns, that included that ESL students and those with lower literacy would struggle, and that not all students would have access to this technology. Potential by a few pre-service teachers was noted for hearing impaired students to be able to access and take part confidently in discussions, and promote reading within the classroom.

*It makes learning/discussion visible, which is particularly useful for students with hearing difficulties or who prefer visual styles of learning.*

Also the character limit of 140 characters was described by some pre-service teachers as a possible difficulty, while others described it as a way of helping students use language that is direct and concise.

Many pre-service teachers felt that Today's Meet had a few more obstacles than Edmodo in its transfer to primary classroom use. By far the biggest concern was that the use of a Today's Meet conversation in addition to a normal class discussion was distracting or hard to follow (52%), with 11% of these pre-service teachers suggesting a way to make this work in their own classroom. Cyber bullying was not mentioned with Edmodo, but with Today's Meet 27% had concerns that this would occur if they used this tool in the classroom, of these pre-service teachers 34% suggested that explicit teaching about social media protocols should be implemented before using Today's Meet with a class. It was also put forward by 14% of the respondents that they felt Today's Meet would be better suited to grade 3 and above. It is clear from this data set that the pre-service teachers feel that the demands of participating in a Today's Meet streamed discussion require a higher level of skills and thinking from the students. The responses also provide another insight into the pedagogy these pre-service teachers are developing. There are clear links between their experiences and those they envision for their future students.

Only 2% of pre-service teachers stated they did not see the educational value of Today's Meet. Most other pre-service teachers saw the positive possibilities of using Today's Meet and were forming ideas around pedagogy:

*Could do a group project with another school,*

*Twitter could be used as a collaborative forum,*

*Would be great for brainstorming at the start of a unit*

*As students comment they are scaffolding each other's learning*

*I think it needs to be 'wow this activity works well with twitter', and not 'How can I use twitter in this subject'.*

The responses about Edmodo and Today's Meet highlight that the pre-service teachers are independently able to critique their experience with these two social media tools using pedagogically informed lenses. They have readily, and in their own words, structured their case for using these tools in classrooms. In addition 34% have also presented possible solutions to anticipated problems. Without prompting or any specific direction to readings about 21<sup>st</sup> century skills and higher order cognitive tasks 85 pre-service teachers were able to use terminology and examples to explain how these tools would be beneficial to their students in a classroom. This indicates that perhaps pre-service teachers have shifted from their original perceptions of new technologies as access to rote/repetition apps and web games. They are developing an understanding of how these new technologies can support the use of questioning and feedback in their classrooms and so begin to articulate more fully the potential of social media tools available in their classrooms today.

### Participants' journey with new technologies: Planning for this cohort and beyond.

In the course of one semester these pre-service teachers seem to have shifted in their perception of the affordances of new technologies in their classrooms. Through their own experiences it appears they identified possibilities for learning spaces that involve collaboration and creative opportunities. They are able to see this as motivating for both their own teaching and their students learning. Perhaps most excitingly a number of these pre-service teachers are aware of their own developing pedagogy and

exhibit, through their own words, confidence to support students to learn through use of these tools.

When considering the implications of this data several points are offered here for further reflection. What are the ramifications of students preferring to use their mobile devices rather than their laptop? Should we continue to look at students in lectures or classes who are using their mobile device and 'assume' they are using it to 'check Facebook'. It might be they are researching an answer to a question or making notes on a point of interest or checking time. It seems that without asking them we will not know the answer. The devices are multi-functional and it is notable that many 20 year old students do not wear watches, but use their mobile device to check the time. Personal use of devices could include listening to music, podcasts or books.

It was evident that many students were not aware of the diversity of games suitable for learning, relying on rote/repetition games. Only 10% had formed a vision for using technologies to secure higher-order learning opportunities for their future students. So the need to support student teachers to strategically think about, and experience, a diverse range of new technologies seems to be highly desirable. After the endeavours made to support broader visions and practices it was pleasing to note that students had begun to more clearly articulate a specific vision for the practical implementation of two social media tools.

We plan to further develop our cohort's 21<sup>st</sup> century learning and skills. While some pre-service teachers are well prepared and eager to explore pedagogy with these tools, there are still some who seek skills in learning and teaching with these tools. Our teaching approach is to model learning using new technologies, as with Edmodo and Today's Meet. Whole class experiences are planned, in addition to restructuring 4 lectures and 5 tutorials to better scaffold the entire cohort towards identifying more potential affordances of Apps and web games. This will explicitly link game based learning that incorporates higher order thinking skills. Collaborative tasks next semester may provide further opportunities for peer tutoring of those lacking confidence. In experiencing the scope of these learning spaces, and involving pre-service teachers in learning through these activities, we will be making explicit the action that can be taken in today's classrooms to incorporate 21<sup>st</sup> century skills.

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