DESIGN-ED: a pedagogical toolkit to support K-12 teachers' emergency transition to remote online education

DESIGN-ED: A Pedagogical Toolkit to Support K-12 Teachers' Emergency Transition to Remote Online Education

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Abstract: K-12 educators face persistent and nascent challenges as they grapple with making an emergency transition to remote online modes of engaging with their students. Crossing the digital divide that exists between multi-site educational engagement is challenging for all educators. A particular challenge is maintaining or, perhaps reconceptualising, the constructs that support social interaction in the face-to-face setting. A second pressing challenge is considering issues of equity when making the emergency transition to remote online engagement that are, in the physical classroom, somewhat mitigated by practitioners and the systems that support them. However in the rush to support this transition it is possible that such challenges could be exacerbated if practitioners are not supported by a sustainable pedagogical process to frame their engagement with K-12 students in remote online formats. This paper explores these nascent challenges, presents a conceptual framework and explicates a subsequent design research model the form of a practitioner focused 'toolkit' that has the consideration of equity at its core. The 'DESIGN-ED Toolkit' adopts and adapts a contemporary, effective and rapidly iterative design process from industry known as Design Thinking. The core components of this this process (empathy, definition, ideation, prototype and test) are pedagogically translated for use in complex and dynamic educational settings such as remote online engagement. Lessons learned from the design, development and iterative refinement of this toolkit over three years are presented and affordances of engaging with such a process are explored.

Introduction

DESIGN-ED, a Design-Based Research (DBR) (Barab and Squire, 2004; 2016) framework for innovation in the domain of K-12 teacher education, is adopted and adapted here to support K-12 teachers' rapid transition to remote online learning. Crossing the digital divide that exists between multi-site educational engagements, or between learning environments is a challenging prospect for many educators given the multitude of factors that impact engagement (Ritzhaupt and Hohfeld, 2018). Of particular concern is maintaining or, perhaps reconceptualising, the constructs that support social interaction in the face-to-face setting (Akcaoglu and Lee, 2016). Presented here is a pedagogical toolkit to help K-12 educators, and others, plan to make effective responses to the transition of learning experiences from the physical learning environment to the online classroom or digital learning environment. Expanding on this, briefly, this paper responds to three areas of critical concern in that inform the development a conceptual framework: student need; teacher response; and equity of access. Subsequently a design research model the form of a practitioner focused Design Thinking (Brenner et al., 2016) 'toolkit' is presented for K-12 practitioners to adopt and/or adapt.

Conceptual Framework

Constructivist learning and related scaffolded social interaction (Vygotsky, 1978) has been a cornerstone of contemporary educational engagement and innovation for some time. Scaffolded face-2-face engagement in classroom settings is the norm as are other aspects of academic engagement such as timing, duration, developmental milestones, rite-of-passage such as graduation, sporting and special interest events (Adams, 1997; Freeman and Ortiz 2019). Daily life at school, over a sustained period of time, allows students to become members of various, interrelated, academic and non-academic communities. However, in the emergency transition to remote online learning the social interactions that support these communities break down. Lenning and Ebbers (1999) identify four distinct learning communities related to educational settings and student interaction: curricular, situational, student-type; and residential learning Communities. All of these communities are representative of the complex interactions that form 'life at school' as distinct from 'life at home'. The pedagogical relationships that are formed with educators that both initiate and sustain

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such communities are somewhat displaced in the move to remote online learning (Flynn, 2016; 2015). The DBR study that underpins the development of the toolkit presented here attempts to mitigate the impact of a fracturing of this complex network of communities by employing Technological Pedagogical Content Knowledge (TPACK) (Mishra and Koehler, 2006; Koehler et al., 2011) model as a design and evaluation framework. The various elements of TPACK were used to iteratively refine the effectiveness of the toolkit to support the transition from face-2-face teaching to online remote learning (Figure 1).

The TPACK model presents four aspects of technology integration: technological pedagogical knowledge, technological content knowledge, pedagogical content knowledge, and technological pedagogical content knowledge. All four of these aspects are considered, within this DBR study as design informants impacting on four interdependent student and teacher focused design variables: individual need, class group need, communication need and technological need. The impact of the DESIGN-ED model is measured in its effectiveness to respond and mitigate these needs.

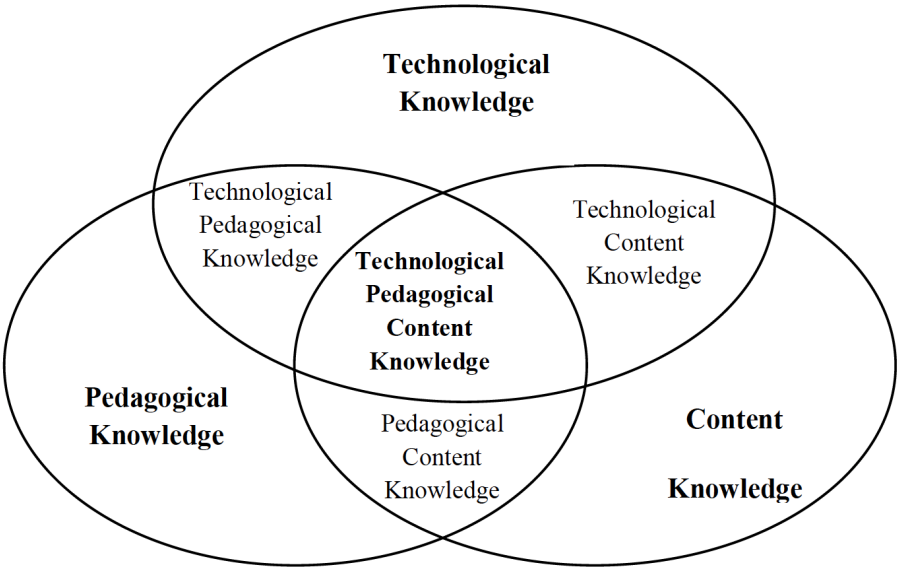

Figure 1: TPACK Framework (Mishra and Koehler, 2006)

Methodology

In order to develop an adaptable and/or adoptable model of innovation for use in K-12 education a generic model of DBR (Barab and Squire, 2016) has been applied to iteratively refine this work over the course of three years. Three iterative cycles of refinement were implemented between 2016-2019. This pilot phase of this study process included an initial semester of face-2-face teaching followed by a move to online remote learning. Cycle 2 followed the same pattern however the final cycle was implemented with students without meeting them beforehand. Triangulated data included pre/post-questionnaires, surveys, focus groups, external feedback and student artefacts. In order to 'map' onto the DBR methodology described in a way that might prove real-world adaptable, the 'DESIGN-ED Toolkit' adapts a contemporary, effective and rapidly iterative design process from industry known as Design Thinking (Brown, 2008; Brenner et al., 2016). Design Thinking is an ever evolving series of iterative action focused on addressing a particular need or well defined problem (Brown and Wyatt, 2010). For ease of access and for the purpose of this paper it is presented here as a linear series of five steps that require constant revision (Figure 2).

Figure 2: Design Thinking 5 Steps (Adapted from Brown, 2008)

Innovation in the field of education, particularly in the domain of K-12 teacher education, often comes from the articulation of success stories from both emergent and seasoned practitioners. Stories of what worked well are most welcome from colleagues and can provide K-12 teachers with a basis on which to try out the same idea or at least to adapt it to their own naturalistic context of teaching. In order to make this toolkit as accessible as possible it is presented as five sequential steps to follow and uses the data collected to illustrate lessons learned. This process has been successfully implemented for 1:1 teaching and with class groups up to 35. The author acknowledges that the presentation of this model requires adoption and/or adaptation for use in cognate settings. The sections that follow outline the five steps in the DESIGN-ED framework which aim to help K-12 educators make the emergency transition to online remote teaching.

DESIGN-ED Framework

Step 1: Empathy

The first step in this process is to try create an understanding of the diversity of student needs within the class group, as a practitioner might know them. The second reason for using an empathy map is to aid in subsequent decision making around pedagogical design. It is vital that we consider the individual needs of the students, and the challenges that they may face during the transition to remote online learning in order to respond effectively. This can be done using multiples of the DESIGN-ED Empathy Map (Figure 3).The following questions may help educators complete this map for students and/or class groups:

- **Said:** What are things this student might typically say in a physical classroom?
- **Thinks:** What are things a student might be thinking while in a physical classroom?
- **Does:** What are some of the actions that a student might be doing in the class?
- **Felt:** How might this student be feeling when in the classroom and engaged in a pedagogical activity?

Additional important considerations may include: special educational needs, intellectual needs, extant or absent social supports. Completion of the map supports lesson planning for transition to remote online learning.

Watch-Out: While an emergency transition to remote online learning will most likely involve students that are known to the teacher, this may not be the case in the future. Preliminary, semi-structured, digital ‘get-to-know-you’ session will help to develop your understanding of the needs of your new students.

Step 2: Definition

This step builds on information gleaned from the completion of Step 1. In a physical classroom educators are attuned to the mood of the class and often respond by shaking things up and taking the lesson in an alternate direction to stimulate engagement. In many instances this can cater for an individual student need that has become apparent. However, the subtle shifts in mood and personal indicators that teachers react to in the physical classroom are hidden in the digital classroom behind avatars, emojis and online personas. It is important that the educator begins to transition from individual need to a class group description of need. This does not mean that the intention to support all students is lost, this is still evident in the initial needs map, however this shift in focus allows a teacher to consider how to approach a larger class group reflective of the approach taken in the physical classroom and where a sense of the mood of the class can be gauged. A space to develop this summary statement or definition is provided at the base of the DESIGN-ED Empathy Map (Figure 3) in the ‘Teacher Notes’ section. The space provided is deliberately limited. Forcing a concise description prompts subsequent lesson planning and technological considerations became more closely aligned. This process was found to aid in the development of class based approach to lesson planning while still keeping the individual needs of the students to the fore.

Watch-Out: Non-completion of this step was found to have a negative impact on 'live’ student engagement during online remote learning. Feedback from students, when this step was completed, indicated that they felt they were supported and more inclined to contribute to ‘live' lessons.

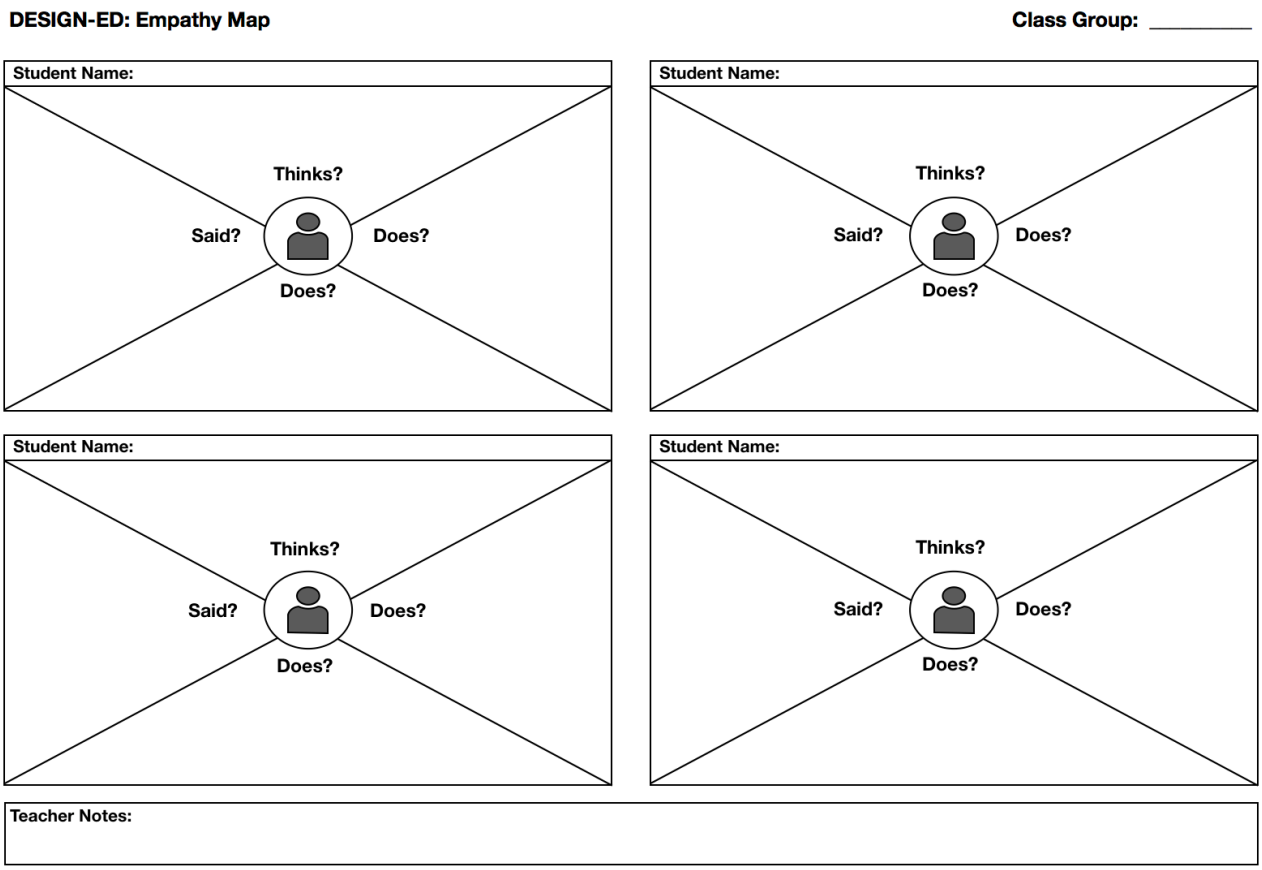

Figure 3 : DESIGN-ED Empathy Map

Step 3: Ideation

Step 3 involves making the transition from what you might have ordinarily done in a physical classroom to the online remote learning space. This step is the lynch pin step in the DESIGN-ED framework. DESIGN-ED key considerations fall under the four concepts of individual needs, class group needs, communication needs and technological needs framed by TPACK. Documenting the demands in both the physical classroom and the emergent demands within the digital classroom reflects the reality of engagement for K-12 students. Students are still using physical resources, albeit in a modified format. For example their classrooms may now be their bedrooms, their desk may be their bed and their physical resources in terms of materials may be quite limited and/or unconventional. The DESIGN-ED Teacher Response Map (Figure 4) helps us consider these concerns from three essential perspectives:

- Physical Classroom Needs
- Digital Classroom Needs
- Teacher Response to Needs

The Physical Classroom Needs are developed from the Empathy Map in Step 1, however in Step 3 they are added to the Digital Classroom Needs of the students. In some instances the needs may remain static, be mitigated or enhanced. Listing these needs side-by-side at a class/group level is an effective way of estimating appropriate pedagogical responses. For example a class group may have a number of students who are normally quiet and reluctant to engage in class discussion. In such instances formative assessment can be challenging. This reluctance may be heightened in a digital classroom. A teacher response may present as an anonymous poll or a request for all responses to be through private chat within the selected online platform.

Watch-Out: While the DESIGN-ED Response Map is useful in scenarios described above it should be noted that sometimes no response necessary. It is the systematic act of consideration that is informative. Sometimes leaving the response box blank is the most appropriate thing to do. It may take a number of attempts to fully understand the challenges presented in the digital classroom and developing a teacher response may take: time, up-skilling and the development of an enhanced digital pedagogical literacy.

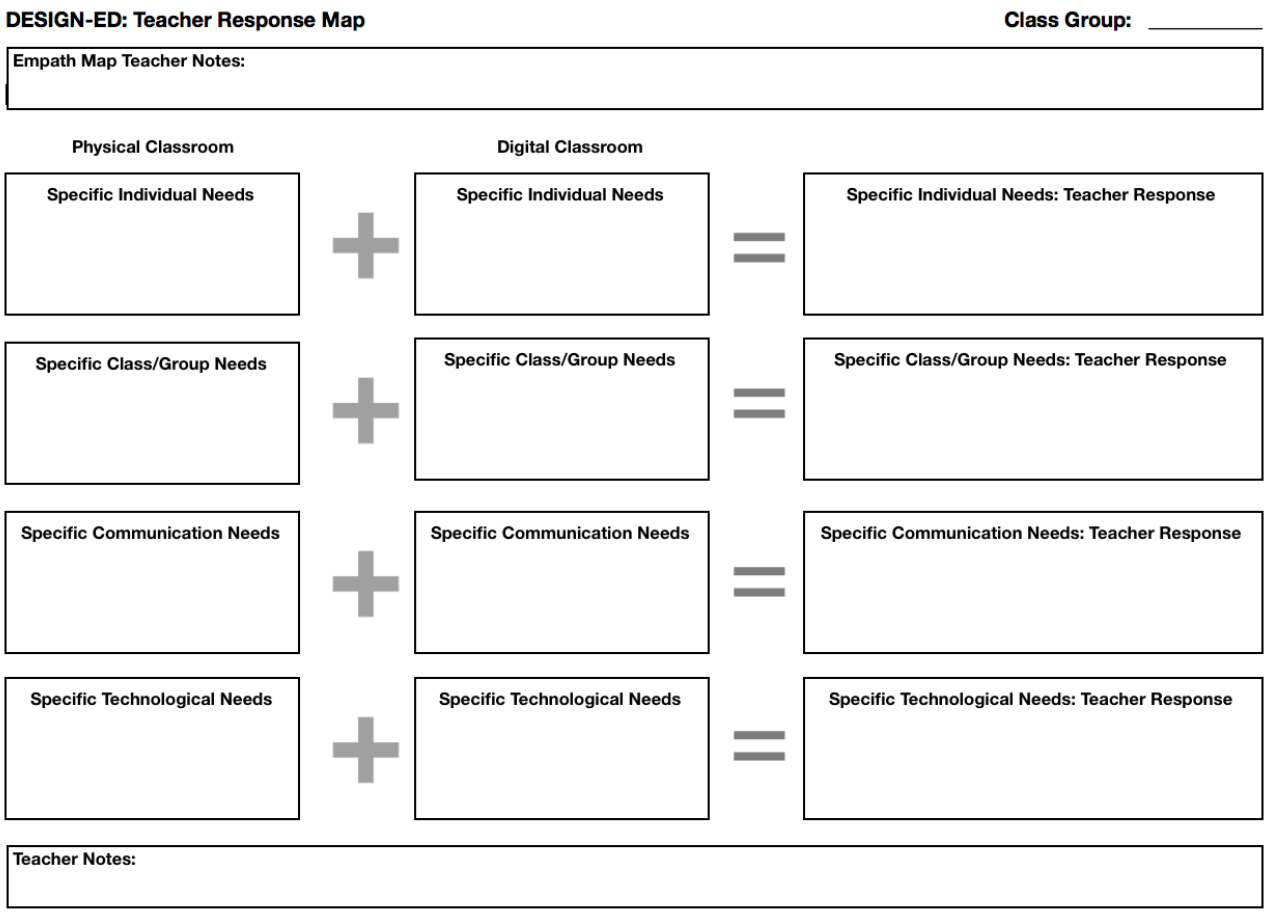

Figure 4 : DESIGN-ED Teacher Response Map

Step 4: Prototyping

Lesson planning is considered a mainstay of teacher class preparation and is a vital step in the process of student engagement (Farrell, 2013; Westerman, 1991). Lesson planning is a form of pedagogical prototyping where each lesson plan is iteratively refined over multiple applications. The purpose of exploring lesson planning here is not to reinvent that particular wheel. Rather, it is to supplement it with necessary considerations that are reflective of the transition being made to remote on line learning. In Step 4, the DESIGN-ED Lesson Plan Top Sheet (Figure 5) is used as an access point to any lesson plan and offers an opportunity to consider the needs of both teacher and student in online remote learning. This Top Sheet is most effective at two specific points. The first is when reusing a previously developed lesson plan. The template can be placed on top of the lesson plan and acts as a 'brake'. This pause in the use of existing lesson plans was found to be important as it forced the consideration of possible pedagogical decisions ahead of real-time. In a physical classroom such issues would normally be dealt with within the flow of lesson emergent from deep pedagogical content knowledge (PCK) (Saito and Atencio, 2016). However, in the remote classroom, the resolution of technological challenges can erode class time and the application of PCK in response to emergent issues can be frustrated due to the digital divide between teacher and student.

The second point is when considering equity access to remote online learning scenarios. The DESIGN-ED Top Sheet was found to be effective, particularly when developing schemes of work, in considering the challenge that both students and teacher may face along with promoting pedagogical responses. For example, when developing content for a class group of 28 students engaged in remote learning, it became apparent that teaching from home presented difficulties with uploading recorded lessons and flipped classroom materials. Another, more common, challenge related to student access to a laptop. Many students (46%) were using phones to view and/or engage with the lesson. Understanding this challenge informed the development of resources that could be accessed on small mobile devices.

Watch-Out: A key watch-out in the application or addition of this Top Sheet to the development of any lesson plan is to resist the possibilities afforded by the use of a particular technological platform. Educators

may not have a choice in platform as this may be mandated by the school of institution. However, even if this is the case this top sheet may also act as justification for not using particular platform features. A second watch-out is to pay special attention to how you wish to share files with students and how you wish the students to retain files and information. Experienced classroom practitioners will know that this is challenging in the K-12 setting. Explicit attention should be paid to this Specific Communication Need and it is recommend that a step-by-step instruction sheet be developed for K-12 students to help them with this aspect making the emergency transition to remote online learning.

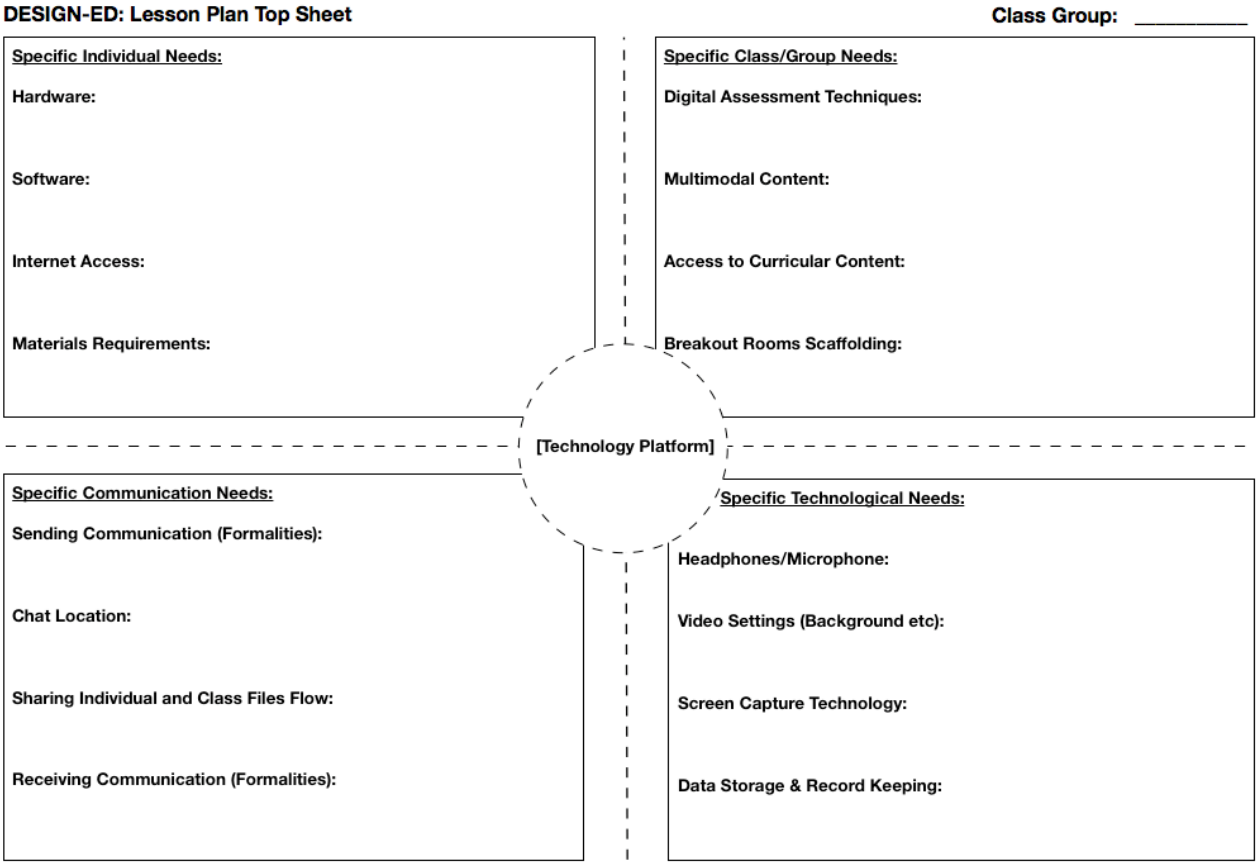

Figure 5 : DESIGN-ED Lesson Plan Top Sheet

Step 5: Test & Reflect

Many lesson plan templates include space for reflection on the lesson that was planned. Typically, prompts such as 'Start Doing, Stop Doing & Continue Doing' or similar allow reflective practitioners to iteratively improve their designed lessons. What makes Design Thinking effective as a pedagogical design tool is a necessary revising of Steps 1-5 as a feedback loop. Step 5 in this process is relatively straightforward and is quite simply a critical revision of Steps 1-4. This is best carried out, where possible, immediately after the lesson with the target class group. This is not intended to be labour intensive process and a different colour pen or text used on the original templates used is most appropriate. This also acts as a documentation of experience over time and details of lessons learned for future reference. For example a critical reflection on planning breakout rooms revealed that more explicit instruction regarding roles, responsibilities and timing was required than first thought. Another critical refection revealed, through email exchanges with students, that a short lesson and supplementary resource was required on email etiquette. A very simple example of this is not only in the formalities of writing an email but also in a request that was made to students to submit images of completed homework tasks by email. What emerged was that the students were unfamiliar with the reply and reply-all function of email software resulting in all students receiving either correct and/or incorrect responses from other students.

Watch-Out: Particular attention should be paid to critically analyse the effectiveness of the planning process from not only positive and negative positions but also from the perspective of innovation. During the course of the framework development it was found that a concentration on repeating what worked well and

discarding what did not work resulted in failures to return to Step 1. In such cases an understanding of the original student needs was lost and the focus of improvement of lessons often became technology focused rather than pedagogical.

Conclusion

This paper presented DESIGN-ED as a toolkit for K-12 practitioners to adopt and/or adapt for use when planning to make an emergency transition to remote online teaching. A brief overview of the multi-ontological framework underpinning this DBR study was presented. The intended audience for this paper is the K-12 practitioner community and, consequently, the illustrations of how to apply the DESIGN-ED framework are contextualised by real-world challenges, emergent from data collected over the duration of the study. The examples are only few of many however it is hoped that they act as starting points for others. Lessons learned presented as 'watch-out' paragraphs for each step might act as examples of how to use the DESIGN-ED framework and inform practitioners of potential pitfalls. It is not suggested that it is possible to replicate of the exact conditions of the physical classroom in an online format, however, the DESIGN-ED framework does presents a process that considers the impact of such a transition for both student and teacher. It is also acknowledged that, while every effort has been made to consider equity, it is important to note that using the DESIGN-ED framework cannot resolve such issues. Instead, it can be used to help identify challenges and make the best decisions possible even when mitigation options are limited during the move to remote online learning. This pedagogical toolkit presents a way of navigating this transition, considerate of the various learning communities that students engage with and is characteristic of the dialogic exchange that teachers apply 'on-the-fly' to emergent student needs the physical setting. The core components of Design Thinking, or five steps, in this process (empathy, definition, ideation, prototype and test) are pedagogically translated for use in complex and dynamic educational settings such as remote online engagement.

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