Entrepreneurism Immersion creates Self Actualization in Primary Education: Partnering with an Accelerator

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Abstract

Background: Entrepreneurism is increasingly popular in middle and high school curricula, reflecting the general trend of increasing entrepreneurism in business; yet, exposure to entrepreneurism in elementary education is minimal. In contrast, immersion techniques are commonly used in elementary schools, although they are typically used for language acquisition. Partnerships between schools and external resources are also commonly used to enhance primary learning, for example, topic appropriate school trips and outreach events. Enhancing learning opportunities that lead children to self-actualization is paramount when preparing children for a successful future by helping learners reach and realize their full potential and foster a desire to become high achievers and transfer new, lifelong skills.

Purpose: Teachers at the British International School of Houston and business professionals from the Texas Medical Center accelerator (TMCx) partnered for an eight week immersive innovation curriculum. The purpose was to teach the children entrepreneurial skills and knowledge that would allow them to become autonomous inventors, accumulating in a pitch and showcase of their invention at TMCx in front of a panel of executive judges.

Intervention: Individuals, including teachers, were supported by the accelerator to become self-regulated, independent learners. Eighty children formed 'start-up' companies in teams of two to four. Techniques and expertise developed by the TMCx business professionals assisted the children in learning the iterative process of invention and commercialization.

These included: customer interviews, customer led solutions, team brainstorming, research about competitors and realistic operating features, and iterating their ideas based on all of those inputs. The children invented marketable health care solutions and created endpoint outcomes of a display model, executive summary and showcase display as well as a team pitch presentation.

Conclusion: Collaboration, motivation and immersion techniques played a fundamental part in developing perseverance and change in perspective amongst the eighty children involved. The process of becoming young inventors and experts in their invention provided opportunity for the children to experience, understand and embrace failure, and also experience and foster ownership, ambition, challenge team work and individual accountability. A dramatic change in mindset and a significant rise in academic progress was observed, as well as a desire to use and apply new skills in other subject areas. The partnership allowed children to use their intuition, previous knowledge, newly acquired knowledge and creativity to reach self-actualization. While

an entrepreneurism curriculum can be challenging for young children, the impact and rewards of exposing such a curriculum at a young age can be broad, ranging from achieving critical thinking to exposing girls to equality before they perceive external limitations. This partnership between a primary school and an accelerator created an innovative way of facilitating a deeper understanding of a new concept and achieved self-actualization through entrepreneurism immersion in the primary classroom.

Introduction

In primary education, immersion is a tool commonly used with language education, but is rarely used in science, technology or entrepreneurism for periods longer than a week. Entrepreneurism in particular is dramatically increasing in the general global population. The US has over 412 accelerators, and there are approximately 60 startup programmers operating across the UK (Telefonica UK, 2014). Accelerators are by definition immersion techniques with intensive learning for adult entrepreneurs to accelerate the progress of their startup companies and increase success rates (Cohen & Hochberg, 2014).

High school and middle school curricula are starting to reflect the trend towards entrepreneurism, including app writing challenges, pitch competitions, and hack sessions. However, entrepreneurial skills are rarely taught in primary school as a separate subject (European Commission Education, 2012), and if so, usually in a limited capacity, such as, operating a lemonade stand, which focuses on the financial aspects of an enterprise. Entrepreneurial skills that stretch beyond financial management include: creativity and creation, critical thinking skills, research, following an iterative process, resilience, and communicating ideas through persuasive written and verbal communication.

All of these key learning areas are transferable and fundamental for primary age development if children are to become self-actualized. Self-actualization is the expression of one's full potential and a desire for self-fulfillment (Maslow, 1954). Children's intrinsic motivation and mindset are critical as to whether children self-actualize (Burleson, 2005).

An individual's mindset can be classified as either a growth or a fixed mindset and is greatly influenced by the individual's reaction to failure (Dweck, 2006). Individuals with a fixed mindset strive to prove themselves and believe that ability is a direct measure of their potential, not something that can be developed or changed. People with this mindset interpret failure as a lack of ability and prefer to avoid challenge rather than risk failure, and often give up easily, become defensive, lack effort, ignore negative feedback and are threatened by success (Dweck, 2006). The growth mindset, on the other hand, is based on the belief that basic qualities can be cultivated through effort and can be developed provided individuals invest effort or study (Dweck, 2006). People that possess the growth mindset display opposing tendencies to the fixed mindset; they embrace challenge, show persistence when failing, see effort as a route to mastering skills, learn from criticism and learn from success (Dweck, 2006). Given that the child's mindset is critical for achieving self-actualization it is useful to assess a child throughout a curriculum on these qualities.

The International Primary Curriculum is a curriculum that operates with discrete periods of immersion learning through three to eight week topics. As the International Primary Curriculum takes a thematic approach, the children aim towards mastery of skills in the foundation subjects through immersion of subject matter. "Inventions that changed the world'' is an innovation topic introduced to children aged 7 years to 11 years of age. An eight week innovation topic

affords the opportunity of 7 to 8 year old pupils to be immersed in innovation learning through exploring, researching, trying, and questioning their experiences and knowledge through planned learning outcomes. This paper describes how a partnership with an external innovation accelerator and their professionals, provided greater depth to the children's learning opportunities and their learning outcomes to achieve self-actualization learning.

Methods

The primary teaching staff of the British International School of Houston, Texas, partnered with a startup accelerator, the Texas Medical Center Accelerator (TMCx), to provide children aged 7 to 8 with a defined version of the International Primary Curriculum related to science and mathematics. Eighty children divided across a four form Year group, led initially by four teachers participated in the adapted curriculum.

The learning spanned 8 weeks with an overall goal of inventing, as a team, a healthcare solution followed by a presentation of the work in a project showcase and a pitch event in the final week. Together, the business professionals and teachers collaborated to define a new curriculum. Table 1 lists revised and adapted objectives created to maximize the teaching of entrepreneurial skills through a rigorous and challenging curriculum.

Table 1. The revised curriculum objectives from a partnership with an accelerator.

Existing objectives	**Revised objectives**
● To be able to design a product to meet a specific need ● To be able to make usable plans ● To be able to make and use labeled sketches as designs ● To be able to use simple tools and equipment with some accuracy ● To be able to identify and implement improvements to their designs and products ● To be able to identify the ways in which products in everyday use meet specific requirements	● To be able to 'pivot' ideas as opposed to 'improving' ideas ● To be able to iterate skills and ideas in a variety of contexts ● To be able to collaborate as a 'company' and amalgamate ideas ● To be able to effectively research specific healthcare products and the science behind them ● To learn about the problems associated with health and healthcare ● To be able to investigate health related issues and existing solutions ● To target a specific audience through exploratory questions ● To find out about the uses of a variety of materials and how these are chosen for specific uses on the basis of their simple properties ● To be able to compose an executive summary of an invention ● To be able to pitch inventions with confidence

Teachers were responsible for the children's learning in their classroom while a variety of business personnel from the Accelerator Team supplemented the process. These included:

1. A current inventor in the startup who visited weekly, sharing insights into how to achieve the next step in the invention process.
2. An executive leader of the accelerator who created an ambitious and inspirational meaning to their work.

3. A team of 10 business analysts to critique work at the communication phase.

A critical goal across teachers and accelerator personnel was to create a growth environment that would promote self-regulation through application and experience. Children and staff were trained to understand the new objectives in which they were expected to work and staff were supported so that they could yield control to the children.

The structure immersed the children in the topic, allowing them to develop and master challenging entrepreneurial skills through the embedded formative assessment and expertise, see Table 2.

<table>
<tr><th></th><th>Where the learner is going</th><th>Where the learner is now</th><th>How to get there</th></tr>
<tr><td>Teacher and entrepreneur</td><td rowspan="3">Clarifying, sharing and understanding learning intentions and success criteria</td><td>Engineering effective discussions, tasks and activities that elicit evidence of learning</td><td>Providing feedback that moves learning forward</td></tr>
<tr><td>Peer</td><td colspan="2">Activating students as learning resources for one another</td></tr>
<tr><td>Learner</td><td colspan="2">Activating students as owners of their own learning</td></tr>
</table>

Table 2: Five “key strategies” of formative assessment (Leahy et al., 2005)

During the first day, teams were formed consisting of no more than 5 children; teachers intervened only where necessary, with subtle consideration given to academic ability. The children were reminded of the International Primary Curriculum learning goals and how they relate to entrepreneurism. These included: communication, resilience, adaptability, cooperation, morality, respect, enquiry, and thoughtfulness. The learning journey from the entry point to the exit point was split into four phases, each phase building on the previous phase’s achievements giving the immersion program a definable structure.

Phase 1-Challenge and Entry Point

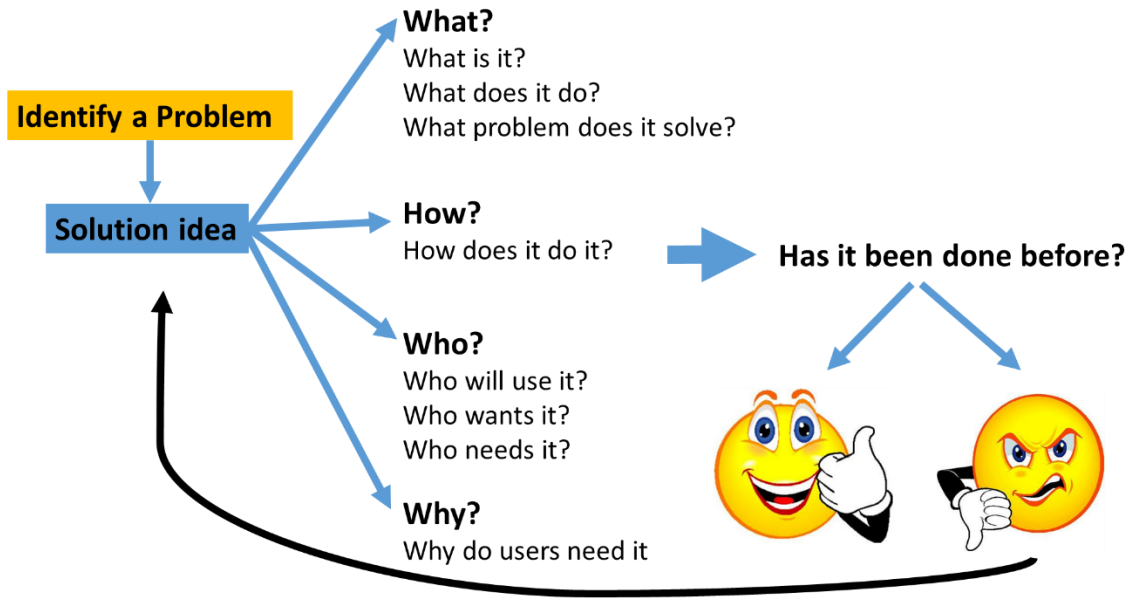
Prior to the partnership, children were questioned by teachers about inventions and healthcare solutions. Health related solutions were chosen for this particular partnership as the partnering accelerator was the TMCx, which specializes in life science and healthcare innovations. The definition of an accelerator was taught by scribing the differences between the Texas Medical Center (TMC) and its accelerator; a new concept to both children and staff.

After clarifying the partnership, the children were set the challenge of identifying a healthcare problem and inventing a solution. Children sketched anatomically correct human bodies before identifying health problems that were related to individual parts.

Phase 2-Accelerator Intervention

A current entrepreneur from the TMCx was introduced to the children during the second week of the topic. Weekly visits were used to introduce specific techniques and skillful questioning was used at an appropriate level of challenge aimed at accelerating the children's thinking. Effective, frequent communication ensured the next necessary teaching points and entrepreneurial lessons from the external visitors were appropriate to the learning. Clear learning intentions were shared with the children in a variety of forms, including questions and statements, before each weekly visit. Weekly session themes included: interviewing, shaping ideas, and communicating ideas. The entrepreneur taught the children specific skills and concepts around these themes. The entrepreneur presented the concept of shaping their ideas using an iterative process during the first visit, see Figure 1.

Figure 1. The iterative process for shaping an idea.



The children were led through the iterative process via a series of open and closed questions displayed on an interactive whiteboard. Existing inventions were introduced and visual prompts identified the innovation behind two commonly used items: the plaster and the water bottle case. The entrepreneur identified the problem, and demonstrated the process required to arrive at a solution. The process of shaping an idea was tangibly demonstrated by manipulating a malleable piece of playdough from a ball into a person. Forming each limb and the head was analogous to the response of each probing question, which shaped and created the final form. The 80 children involved in the demonstration were encouraged to refer to these prompts throughout the hour long session.

The children understood that the process was a cycle and that non-viable solutions would result in a pivot; a term introduced by the entrepreneur meaning 'change strategic direction'. Classes were allotted time with the entrepreneur to iterate the process until they felt confident enough

to apply the process independently. Visual prompts, such as questions, were replicated in each classroom to consolidate learning.

During the second week, a research technique, based on the 'Lean Start Up' (Ries, 2011) and LaunchPad method (LaunchPad) was used. Critical thinking techniques, via a deep-dive questioning strategy, encouraged the children to think about their invention from a number of different perspectives. All of the children involved were required to interview "customers" in their inventive process. Year 6 at the school was used, although any school year would be valuable. The children composed 10 exploratory questions. The interview session lasted 40 minutes and specific invention ideas were not mentioned or discussed. Children conducted their interviews in a productive, serious manner. Their choices for recording the answers included, a journal, paper later organized into a folder, or directly onto their initial draft. Teacher's modeled analyzing data during a daily session prior to the analysis. Results were analyzed by the children and required them to think critically about continually modifying preconceived ideas and suiting the needs of a consumer.

Teams delegated mini tasks and used findings of their research as feedback. Research techniques used included: effectiveness of materials, the impact an illness can have on lifestyle, healing time, the healthcare problem, competitors, and gaining more knowledge and understanding of the area. The children were taught to research by using search engines and reference books in the school library.

A visit from a C-level executive from TMC who was also a successful entrepreneur was used to set the scene for phase 3. His 90 minute visit added gravitas to the experience by explaining his success, providing valuable tips and raising the profile of the final pitch. During the visit, incentives were added such as pitching to a panel of expert judges from esteemed Universities, leading healthcare executives and business analysts. The executive asked questions about each team's invention and raised the importance of being able to communicate their invention as an entrepreneur. He gave equal importance to each team and gave honest feedback about the inventions.

Phase 3-Communicating the invention

A pitch and showcase with a display and model were created with the goals of communicating their invention and its development in a concise manner.

Visual Communication

Children used their final design to make a model of a prototype. The children were shown how current entrepreneurs showcased their inventions on current television shows such as UK based Dragon's Den and USA based Shark Tank. Children followed their design brief and specification for a period that spanned over 2 weeks. Some of the teams made lists and gathered required materials, while other teams assigned 'resource monitor' roles to members of the team. These roles appeared to be fluid and changed daily without disruption or disagreement. Teams were allotted 2 hours a day for model making and could decide when and how they would like to use

their 2 hours. For example, some teams worked on the verbal communication aspect discussed below, whilst others made models or started their tri boards.

Verbal Communication
The teams wrote a 2 minute pitch that involved every member of the team. The pitches were written against a set of success criteria class, and equal participation was required. The criteria included:

- I can state my team's opinion by making strong points
- I can use a new line when a new member of my team is speaking
- I can back up my opinion with evidence of consumer needs
- I can use statistics as evidence
- I can use conjunctions such as therefore, furthermore, although, to add extra information
- I can use exciting vocabulary to make the judges want to invest in our invention
- I will include a convincing conclusion

Team members individually wrote their pitch in the form of a play script before valuing aspects of each other's ideas and filtering any unnecessary statements to collaborate their ideas into a final draft. The teams used previously taught proofreading and editing skills to add further justified edits. Teachers proofread finished drafts.

A series of practice and feedback sessions occurred to help the children refine their pitches. The entrepreneur gave individual feedback to each team relating to pace, body language, pitch content and relevance. Eight business analysts from TMCx and 2 local University accelerators (Rice University and the University of Houston) came to the school for 2 hours. This helped with pitching and questioning techniques as well as providing the children with the opportunity to practice in front of many different, unfamiliar people. Analysts were assigned to specific teams so that on the final pitching day, they could help put the children at ease.

The external pitch feedback sessions with the entrepreneur and TMCx business analysts facilitated direction and confidence as they helped teams to refine their pitches and strategically plan action for public speaking. Feedback followed the following structure:

1) Clarifying the team's intentions.
2) Valuing aspects of the pitch that worked really well.
3) Stating any concerns and need for improvement.
4) Suggesting ways of making improvements to pitch content, body language, inclusion of statistics, interaction with the audience, ability to answer questions about their invention and techniques for improving confidence.

Individuals were assigned to different companies to provide expert guidance relating to pitch content, relevance and performance. The accelerator organized a rotational pitch practice

carousel. One team pitched, another team acted as the audience and the final team acted upon feedback in order to polish their pitch before repeating the process. The children were impeccably behaved, engaged and self-regulated. Teachers monitored, observed and learnt strategic planning techniques from the accelerator, so that they could repeat techniques prior to the main event.

Additional pitch practice included the children pitching in different locations to different objects such as flowers, teddies, TV, mirrors, walls and benches. A competition was set up for the most 'extreme' pitch. Children sent videos and pictures into school as evidence of them practicing their pitch in different ways. These included swimming pools, trampolines, video blogs, visits, practice to family pets and zip lines. This technique was used to practice the pitch in variable settings so the new environment in phase 4 would still feel comfortable. It was also used to instill confidence in the children, develop their ability to memorize a script and deliver their pitch effectively.

Written communication

Tri boards were made to display the 8 week learning journey so that information could be shared without explanation. A generic list of criteria for the tri boards was agreed upon as a guide. The list included: technology, photographs, final design, executive summary, pivoting. The children were provided with an example of an executive summary written by the entrepreneur from the accelerator before writing their own. The short document communicated their invention through explanations of the main features and benefits of their invention as well as information about their team. As well as displaying the executive summary, hypothetical investor questions were prepared to enable teams to summarize their inventions in a concise manner, allowing them to rapidly acquaint people with their invention.

Phase 4-The Main Event.

A pitch and showcase event with esteemed judges from the TMC and local businesses occurred at the TMCx building in Houston on June 23rd, 2015. Parents and other distinguished guests attended with an audience of over 200 people. Each team pitched their invention on stage to the judges. The pitches were 2 minutes long and therefore had to be both convincing and powerful in a succinct manner. The judges asked 1 or 2 questions to the team on stage after the pitch. Teams also showcased their inventions with a display and model on their own display table situated around the auditorium. Name badges for each child and team names on each table set the scene for a grand event rich in gravitas as they described and demonstrated their inventions to passersby. Teams were judged on pitch and showcase presentations as part of a set of criteria. Trophies for specific entrepreneurial categories were awarded: Most Innovative, Quickest to Market, Best Pitch, Best Prototype, Biggest impact. The executive presented medals to every child to celebrate commitment, dedication and effort. A celebratory private lunch with the accelerator executives and staff was provided as well as goody bags containing personalized memorabilia from TMCx.

Impact

Phase 1

Written responses that elicited prior knowledge varied, they lacked understanding of the topic and all had a common theme. The majority mentioned a specific inventor, a specific invention or an opinion about inventions. While sketching and mind mapping as a team, the children discussed what they deemed to be the best solution and were able to arrive at an end point in less than 60 minutes. The outcomes of the initial designs were cartoon-like and included various parts of machinery such as drills, robotic arms or buttons. Sketches consisted of multiple buttons and gadgets that were robotic in appearance. A number of the teams labeled their designs, but labels mostly referred to generic materials such as plastic, wood and metal or devices such as buttons, handles and helmets. Captions on the initial designs were vague, provided little explanation and predominantly referred to individual parts without comments about their function. Solutions that were produced as a result were impractical, over complicated and unrealistic. When asked to set some personal, team goals, many children set individual goals often unrelated to the topic, these included "trying their best", "helping one another", "making writing neat", "listening" and "designing the best invention", with little consideration given to costing, solutions that already exist, marketability or working as a company.

Challenges. Conversations observed during Phase 1 consisted of children discussing with one other child or talking in parallel to each other.

Obstacles. Generally, children had not recognized their own strengths to contribute to the project.

Criticism. Many of the initial inventions were mechanical, although the children had a limited understanding of what the mechanisms were or how they worked. When questioned, basic responses included children stating how the metal or mechanical part would fix the problem through movement. When critiqued, the children were polite, but expressed a strong desire to submit their first design as a final solution and saw no scope for improvement. Conversations lacked knowledge about health care. Assumptions and misconceptions made by the children regarding specific illness and individuals refused to take accountability for their chosen solution. Many children lacked independence and sought an adult to reassure and question them before questioning members of their own team.

Success. The majority of children exhibited frustration during this initial stage and struggled to negotiate with each other. Many conversations were competitive, in the first person and egotistical. When questioned by teachers about their first ideas, the children fought to be heard; which resulted in children failing to respect each other's opinions. Children became deflated and displayed this in different ways; some children withdrew from team discussion, refused to participate, cried and made many negative comments. Individuals displaying these behaviors rarely participated in discussion with other individuals and refused to initiate

discussion. Many of the teams sketched individual drafts of their ideas and did not work collaboratively. As a consequence disagreements surfaced between individuals.

Phase 2 - The iterative process

At the beginning of this phase the children were talking about their inventions in a vague context with little entrepreneurial terminology, knowledge or understanding. Many teams gave generic answers referring to people as a whole rather than individuals experiencing specific health problems. The children were able to answer closed questions such as 'What is it?' with ease, but challenges were encountered when responding to open questions in the context of inventions. This was addressed through consolidating and reinforcing the iterative process.

Captions and labels continued to lack depth and minimal consideration was being given to materials. Two weeks later, they were no longer using generic terminology, instead accurate scientific phrases were used to communicate between individuals. For example, in one team the children were discussing the central nervous system, the function of nerves and motor control. In comparison to early designs, the children now talked about properties of materials, the cost of material, suitable mechanisms and whether or not their research focused on their specific problem.

Challenges. Thinking was challenged through discussion about how their invention could have an impact on the world. Some teams deliberated over how they could modify their ideas when they had multiple ideas on the paper. Teams interacted simultaneously and then decided to merge their ideas into a third draft. The iterative process was providing the framework and subdued children began to take an active role in contributing ideas. Resilience was resonating throughout the teams as they supported each other through assistance towards their end goal. Rather than becoming frustrated by the concept of pivoting, they were observing and questioning aspects of their learning. Failure was embraced socially and academically as they confronted the challenge.

Obstacles. The majority of children established how they could use interview responses to improve their invention and many pivoted. Discussion centered on the impracticalities of how their initial ideas took place in many of the teams. A number of the children became angry, deflated and defensive about reverting back to the start of the process. Similar behaviors seen in Phase 1 presented themselves while others embraced change by adding to their previous sketches or starting over again. Many of the designs were highly focused on consumer needs, but further research into design detail was needed for progression.

Effort. Children showed initiative by pairing with their peers, translating language, creating visual pictures, modifying initial designs and requesting adult guidance. Teachers explained terminology before progressing with their interviews. Children were iterating the process independently by using techniques such as splitting from the team and then rejoining to share their knowledge. As many healthcare solutions already existed for their chosen problem,

children found the need to investigate illness further. The children established early a lack of knowledge about the cause and its effect of illness on the self and the physical human body. Every child was motivated, showed increased persistence when carrying out their task and was fully engaged in their research.

Criticism. The children questioned each other as well as the entrepreneur about their inventions. Eagerness and intrinsic motivation were expressed by inviting the entrepreneur to see their first drafts. Teams took ownership of their ideas. Initial ideas were modified and most teams generated an abundance of independent ideas. They then began to learn cooperatively to amalgamate their ideas. Withdrawal behavior was replaced by individual children taking an active role in suggesting ways to merge ideas. A larger percentage of the children involved were beginning to respond to and act upon feedback immediately. They were receptive and immediately accepted advice from an expert. Teachers witnessed children debating over new terminology such as the comparison between invention and innovation. Rather than arguing, becoming frustrated and competitive, children arrived at the solution by enquiry. Although support was needed when shaping ideas, the children made criticisms of their initial ideas and identified a need for improvement. They identified next steps in a positive manner and implemented taught skills by drafting and re-drafting solutions.

Success. The children began to collaborate and converse in the second and third person when improving their initial thought processes by pivoting. They accepted advice from other teams and valued other perspectives. Children that had refused to cooperate or listen to ideas were equally participating in discussion about how to pivot. Some of the more confident, natural leaders in the teams delegated roles by identifying strengths and weaknesses within the team while working hard to find success. Children collaboratively mind mapped physical effects related to their invention and their idea was furthered by considering the social and emotional impact of illness on the human body.

The majority of children used effective strategies to set achievable goals for their teams. The children were less competitive, motivated and managed their time effectively. Members were aware that every team member needed to persist in order for the whole team to succeed. Ideas were enhanced by evaluating their own work as well as self-monitoring progress at a sensible pace. Some of the children became overwhelmed with the amount of existing healthcare solutions, however, most children realized how competitive the market is and were driven to not only improve existing solutions, but improve them in an efficient, organized manner. Various resources were brought from the home setting, as well as being created by their self-initiated research.

Children praised each other's progress and made suggestions for improving elements of their invention. The potential of using elements from existing solutions was considered and suggestions were made about how to produce more effective designs.

The pace of the teams' progress varied as each team shaped their ideas. Some teams finalized designs while other teams encountered logistical difficulties. Teams welcomed the idea of taking risks to overcome these difficulties by preparing ways of moving forward. They supported each other through the process and encouraged each other consistently. The children began to take pride and ownership of their inventions and mind mapped other possible solutions independently. During the final stages of Phase 2, most of the teams were working cooperatively and recognized the potential of themselves, others and their designs. Specific teams were able to talk with confidence and could answer questions succinctly.

Examples of team specific learning:

1. During week 4, through self-regulated research, one of the teams discovered that their invention already existed. Instead of displaying negative behavior, the children showed resilience and agreed upon a solution to their new problem. Two members of the team immediately thought back to the iterative model, and used the skill of iteration. Consequently, after four weeks the team was independently using entrepreneurial techniques.

2. A team that had invented a mask to prevent nose bleeds discussed the benefits of using synthetic polymers inside the mask. They used the current vocabulary, but also gave a definition of the words by directing peers and teachers to the original research source. When further questioned, team members confidently demonstrated their new learning by cutting open a baby's nappy (diaper). They were able to disseminate new knowledge to a wider audience.

3. A team of children that had developed a mobile to monitor a baby's health had daily conversations about equations and combinations, whilst another team discussed the spatial slider mechanism used to retract wheels in an airplane. They were overcoming obstacles without becoming frustrated and negotiating by applying and understanding an extensive new vocabulary. They were fully immersed in their learning. The children had employed the techniques introduced by the accelerator and they understood, fully, the ambitious aim of producing high quality innovative solutions.

Phase 3

When mind mapping success criteria with the intention of writing an investor pitch, it was evident that the children's ideas were inhibited by their experiences with marketing media. Children were shown clips of current entrepreneurial television programs and quickly began to focus on the financial aspect of entrepreneurship. Initial discussions were heavily focused on how much revenue their invention would generate. The entrepreneur intervened at this point and used a strategy that modeled how to pitch the unique features of innovation, the impact the invention would have on the world, the statistics behind the research, the amount of market research involved in the iterative process and the effectiveness of the company.

Challenges. Even though the children were faced with challenges when creating models, they regulated actions towards the end goal by referencing previous briefs, setbacks, drafts and research. Many teams used their design brief to identify their key aims by underlining key words.

Obstacles. A trial and error approach was taken when using various materials. Many of the teams discussed materials that would be suitable for the model, considering mechanisms that marketable products require. When parts of their models appeared to be defective, teams worked as a production line using iterative strategies in a self-regulated manner.

The pitches could be assessed against the success criteria previously agreed upon, however, the pitches represented commercial advertisements and a huge proportion of the children lacked confidence and language capability when speaking in front of an audience. Accountability fell upon the children with better proficiency in English, children who could confidently talk in a new context, children who could engage their audience with appropriate body language and children that speak in a suitable tone of voice.

Effort. Initiative was taken to create a working prototype and, unlike behaviors seen during Phase 1, children worked with impetus and dedication. Quiet, focused teams discussed strategies that would enable them to improve their pitching skills. Interestingly, the team of children that had been given the most praise during the executive visit, lacked effort and were less accepting of feedback. They listened, were polite, but made minimal improvements to their final pitch.

Criticism. Traits of withdrawal reappeared in the less confident children. They rounded their shoulders, were distracted by the responses of others and became upset. The children compared themselves to the more confident speakers. When the more confident speakers presented in front of the class, less confident children either became uninterested, fixated on the confidence of other children or commented about other children's superiority.

Success. Children showed compassion and empathy and did not let failure define them. The iterative process needed to be followed regularly and children directed each other to overcome barriers. For example, a team inventing a baby monitor was hindered by factors such as the weight and angle of the toys suspended from the frame of their model. The team took the initiative to destroy the first attempt and start again. The destruction of their model was undertaken in a positive, productive manner. They worked cooperatively and collaboratively to improve and they had evidently learnt from previous mistakes.

Teachers observed the children muttering to themselves during independent time, standing and talking to rubbish bins, walls and doors. One teacher observed that she walked past the children's bathroom at playtime and could hear a child practicing to the mirror. Other children were present; however, the child was unconcerned. More importantly, the child could be heard speaking with confidence and correct intonation from the corridor. The children were choosing

to practice their pitches independently with dedication, shown via self-initiated, regulated practice.

Phase 4

The final event was an impressive display of 7 and 8 year old's inventions and communication. None of the 22 teams faltered and they performed at their best during the pitches and for the judge's questions. Most importantly, the children experienced a sense of success because of their achievements and experiences. They were amazed at what they had produced and their ability to present confidently. They also understood the value of specialist support and challenge in this whole process. The end of this specific TMCx journey occurred June 2015 but the continuation of their lifelong learning journey continues using these new found skills and knowledge.

Conclusion

The immersion of entrepreneurism in primary education through a partnership with an accelerator maximized learning and growth. The final display and work achieved reached a level far beyond their years, and critical thinking, failure resilience, self-regulation, and team cooperation were all dramatically improved for all children. This is in stark contrast to the asymmetry in performance between the top and bottom 10 percent of pupils (Wiliam, 2007), and also the asymmetry witnessed at the beginning of the curriculum. Excelling beyond age group expectations can be viewed within the self-actualization context as more of the children's potential was realized through this curriculum. The two key features of the curriculum: immersion and partnership with an accelerator, were critical for this success.

The immersion training fostered ownership of the project for the children and enabled deeper thought and analysis as they worked through long, uninterrupted learning periods without additional learning obligations. The immersive environment also meant there was little opportunity for challenge or obstacle avoidance, accelerating the process of facing failure.

The partnership with the accelerator provided external accountability for the children. However, it was the expert teaching the accelerator provided that proved invaluable for guiding the children as they experienced inevitable failures and provided a role model for how the consequences of failure can be minimal or minimized (Shank & Neaman, 2001). An innovation accelerator is well versed in challenges, obstacles and the skills necessary to persevere through failure. These are the daily struggles of entrepreneurs. An entrepreneurism curriculum, where children invent their own solutions in an iterative manner, provides the environment of repeated failures, consequently, resilience to failure is indirectly learned and self-actualization is facilitated.

Indeed, the resilience to failure was a dramatic observation of the children in the present curriculum. The children's mindset can be further broken into Dweck's mindsets throughout the phases of the curriculum. Traits of the two mindsets, fixed and growth, heavily influenced the

children's journey towards self-actualization during the immersion curriculum. Traits of a fixed mindset were apparent in many of the children in phase 1 and early phase 2, see Figure 2. Challenges were avoided with lack of participation and ownership, obstacles were viewed as failure, competitiveness and negative responses to feedback were common.

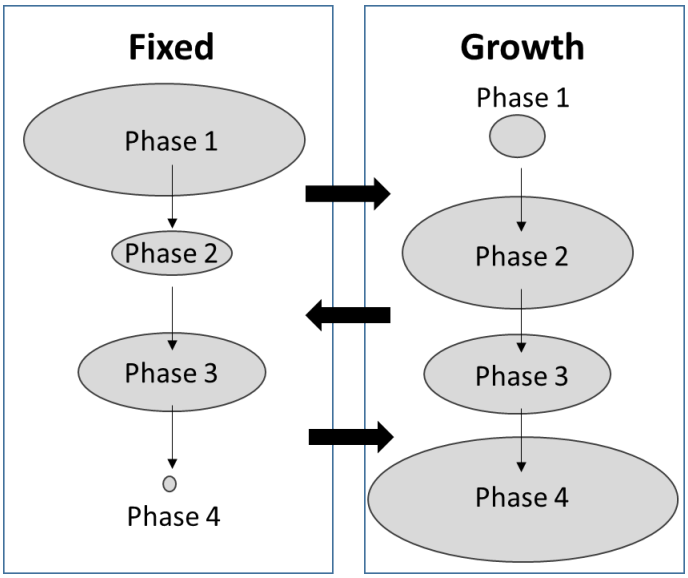


Figure 2. An approximate representation of the number of children in either a fixed or growth mindset at each phase of the curriculum. Children generally moved from fixed to the growth mindset, but some reverted when faced with the new challenges of the new curriculum phase.

In contrast, more children than anticipated displayed traits of a growth mindset by phase 4. By phases 2-4, the children were independent and happily talked about feeling self-motivated; they were self-regulated (Butler and Winne 1995), and were able to monitor, direct, and regulate actions towards the end goal by acquiring knowledge, expertise, and self-improvement (Paris & Paris 2001). The majority of children were embracing challenge and viewed failure as an opportunity to learn, a part of the iterative process.

Another critical part of Dweck's mindset model is how failure is managed in the context of others. Throughout Phase 1 and 2, team dynamics changed. In the initial stages it was apparent that some children were addressing self-esteem issues, whilst others were consolidating trust and friendships within the team. By the end of Phase 3, the children displayed deep friendship bonds and positive interdependence (Johnson, Johnson & Holubec, 1998). Many of the children gave emphathetic responses when others found things challenging. They praised the process strategies that their peers were using and iterated learning from failure. Compassion had developed in the vast majority of the teams. Conversations in the first person shifted to the second and third person, and children saw value in their collaborative efforts. Children were feeling accepted by their peers and through self-evaluation, had a sense of academic affirmation.

Overall, those with the growth mind set found success in doing their best, in learning and improving (Dweck, 2008). Challenges were embraced, collaboration and feedback was sought and ownership was strong. With the right mindset and the right teaching the children realized their potential (Dweck, 2008). In fact, the curriculum also influenced the teaching staff as their

assessments were also in terms of growth. A fixed assessment was not possible within this curriculum and thereby, automatically encouraged teachers to implement the growth learning concept (Vygotsky, 1978). As a result the children experienced a dynamic and beneficial learning environment where at each point of the child's learning the teacher had to make an instant assessment, which then led to the next learning point for the child. That in turn led to the next creative solution to the problem and still more learning. Communication between the accelerator point and teachers was critical for maximizing this effect and the subsequent learning.

Together, the partnership and immersive techniques created a powerful, tailored curriculum that empowered the children to be experts of their invention. It positioned the children as enquirers, developing entrepreneurial expertise. They were entrepreneurs, learning in a purposeful context through trialing methods that would lead them to success (Donaldson, 1979). What was evident however, was the children's uninhibited creativity, flare and passion for the topic. Through an immersive curriculum in partnership with an accelerator the spirit of entrepreneurship can be instilled from an early age, helping children reach a growth mindset to achieve self-actualization.

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