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EXAMINING THE EFFECT OF FEMALE STUDENTS' MINDSET ON THEIR APPROACH TO CHALLENGES WHEN LEARNING MATHEMATICS

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Abstract *Students' capability to persist when challenged is a prominent issue in many mathematics classrooms. Students, in particular female students, often do not persist with challenges because they hold the belief that they are not intelligent. In this paper, a Bachelor in Mathematics and Education student investigates if teaching female students about the implicit theory of intelligence, known as mindset, changes how students face challenges when learning. This action research project was undertaken as part of a teacher education programme and conducted with female students aged 15-16 years old in a post-primary classroom in Ireland. Overall, findings suggest when female students learn about the malleable nature of intelligence and, in particular, about growth mindset, they persist with challenges and use them as areas in which they can learn.*

Keywords: intelligence, growth mindset, post-primary level mathematics education, effort, challenges

Introduction

There is a common misconception that achievement in mathematics is often based on an innate ability in the subject and not linked to effort put in by a student (Ernest, 1996). Wood and Smith (1993) highlight that students in post-primary schools view mathematics as the most difficult subject in school, as a result of this they may believe only highly intelligent students will perform well in mathematics. When faced with a challenge in the mathematics classroom many students do not persist. They believe that they do not possess the innate

ability in mathematics needed to overcome the problem. This can be described as learned helplessness (Seligman, 1972).

In my teaching I have observed that many students, in particular females, hold themselves back when studying mathematics. Students limiting themselves could be explained by their belief that they are not intelligent enough. This is a learned behaviour which has shown to affect motivation and effort when completing a task that is perceived to be difficult (Seligman, 1972). I wanted to develop teaching skills to counteract this. One of the main theories I became interested in was Carol Dweck's theory of implicit view of intelligence and the growth mindset or incremental theory of intelligence (Dweck, 2000). Dweck (2007) found that this attitude could be counteracted by teaching students about mindset. She taught a group of students about the nature of intelligence focusing on the incremental theory of intelligence and the growth mindset, which promotes the idea that intelligence is not fixed. Her research suggests that when students learn about intelligence and mindset they tackle challenges as an area where they can learn. This has been seen to improve academic performance.

Accordingly, the purpose of my research was to change how students face challenges by changing how they perceive intelligence. I wanted to deduce if you can change a student's view of the nature of intelligence and if this has an effect on how they approach challenges in their mathematics learning. This led me to the research question; Can I, by teaching my students about the nature of intelligence and, in particular, a growth mindset, encourage my students to approach mathematical challenges as areas in which they can learn? The main reason for choosing this topic was that I wanted to develop teaching and learning skills that will lead my students to achieve their potential in mathematics. The research was completed in an inner city all-girls school. A four-week course on the nature of intelligence was completed with a group of eleven Transition Year students (age 15-16 years old), from a lower socio-economic background. This paper examines literature relating to the nature of intelligence, in particular, mindset and the effect this has on facing challenges in mathematics learning. A mixed-methods approach was utilised and data triangulated in order to enhance interpretations of the findings. Analyses were conducted and relevant findings are presented. A discussion on how the findings of the research relate to the current research on the topic is included. This is followed by a conclusion which outlines implications of this research, future action for further research and consideration for professional practice.

Literature Review

Intelligence has long been debated, and there is currently no formal definition. Many academics have researched intelligence and proposed definitions which vary between disciplines. One of the earliest ideas on intelligence was developed by Galton in 1883. He developed a theory based on the idea that people understood the world around them through their senses (Kaufman, 2000). Later Binet developed the concept that intelligence was a 'single global ability' (Kaufman, 2000, p.445). His research was the basis for the

development of the Intelligence Quotient and subsequently the Intelligence Quotient test (IQ test; Kaufman, 2000). Since Binet there have been many theories about the concept of intelligence. Many of these theories suggest that intelligence is an "ability". Sternberg proposes "intelligence as comprising the mental abilities necessary for adaptation to, as well as selection and shaping of, any environmental context" (1997, p.1030). The idea that intelligence is an ability has been further explored by Gardner. He suggests that intelligence is not a single global ability as previously thought by Binet, but a collection of abilities. He introduced the theory of Multiple Intelligences (MI). This theory expands intelligence into seven separate intelligences which include Verbal/ Linguistic, Visual/ Spatial, Interpersonal, Musical/ Rhythmic, Logical/ Mathematical, Intrapersonal, Bodily/ Kinaesthetic (Gardner, 1983).

Dweck and Leggett (1988) developed the implicit theory of intelligence. This theory refers to a person's underlying belief about the nature of intelligence. There are two main beliefs about the nature of intelligence. These are the entity and incremental beliefs. The entity view promotes the idea that intelligence is fixed and cannot or will not change over time (Rattan, Good & Dweck, 2012). Conversely, the incremental view suggests that intelligence is malleable and can be moulded and changed over time (Butler, 2000; Heslin, Latham, & Vandewalle, 2005; Plaks, Stroessner, Dweck, & Sherman, 2001). Dweck (2007) suggests that a student's implicit view of intelligence affects their attitude towards learning. She researched students with both an entity view and an incremental view of intelligence and their attitude towards learning. From this research, she developed the theory of mindset. This consists of two concepts of how people view intelligence; The Fixed Mindset and The Growth Mindset.

If a student adopts the entity view of intelligence, believing intelligence is fixed, they have a rigid view of their own intelligence, a fixed mindset (Dweck, 2007; 2012). Dweck proposes that these students see a failure as a knock to their ego. As a result, they are less likely to examine failures or see them as areas where learning could be achieved. Dweck observed that the students with a fixed mindset were less concerned with learning. She suggests that these students attribute effort to a lack of ability and being less intelligent. If failing in mathematics, these students tend to believe one of the many myths about mathematics, such as "some people have a mathematical mind and some don't" (Lane, 2012, p. 32). Dweck also notes that students can adopt a Seligman's (1972) 'helplessness attitude' towards learning. A helplessness attitude is a learned behaviour which has shown to affect motivation and effort when completing a task that is perceived to be difficult. A helplessness attitude is seen in students who believe they are not smart enough to complete a task (Dweck, 2007). In contrast to this Dweck (2007) suggests, if a student adopts the incremental view of intelligence, believing that their intelligence is malleable, they will be more motivated and tend to apply more effort and achieve better. The incremental view suggests that students have a better outlook on learning. The belief that they can improve or enhance their intelligence helps them to see failures as opportunities to

improve their knowledge and understanding and not as a knock to their ego. These students typically hold a growth mindset (Dweck, 2012). Lucas and Claxton (2010) also adopt the concept of malleable intelligence. They propose that intelligence is linked to 'learning dispositions' which can be learned.

Table 1: Fixed Mindset v Growth Mindset

	Fixed Mindset	**Growth Mindset**
Perception of own intelligence	Rigid. Can not change overtime.	Fluid. Can change overtime.
Perception of failure	Knock to ego. Personal defeat.	Area to be improved. Strive to do better.
Perception of mistakes	Reafirms lack of ability.	Opportunity to learn.
Perception of Effort	Shows lack of ability.	A path to success.

From Table 1 it is evident that students with a growth mindset see obstacles in their learning as a challenge and strive to do better. These students see success as stretching themselves. Whereas students with a fixed mindset see failure as a personal defeat. They do not believe that they can learn from failure and are interested in succeeding or looking like they have succeeded (Dweck, 2012). These ideas can be seen in the mathematics classroom as "students' self-efficacy for mathematics may be defined as their judgements about their potential to learn the subject successfully" (Tait-McCuthcheon, 2008, p. 512). It is important to teach students to see obstacles as areas of improvement. To achieve this, teachers must promote the idea that failure in a topic is an area where you can learn and not solely a negative outcome (Dweck, 2012). To promote a growth mindset, the teacher should encourage and promote effort and not solely achievement. Tanner and Jones (2003) suggest that the development of a student's self-concept in mathematics should be reinforced and encouraged by the student's mathematics teacher. Without this positive reinforcement and encouragement, the student will develop a lack of self-efficacy. Their study showed a direct correlation between success in mathematics and self-efficacy in mathematics. However, Dweck (2016) is quick to highlight that it is not just about praising effort. It is important that students try new strategies and are supported by others (e.g. the teacher, peers) when they encounter challenges in their learning. Accordingly, it is important that students are made to feel good but an emphasis also has to be placed on learning/improving. Therefore, it is important that a *sturctured programme* is in place to support students in the development of a repertoire of approaches when faced with challenges in learning (Dweck, 2016).

Research demonstrates that when females are informed, and a growth mindset framework is utilised, that they can do as well as others in mathematics and other subject areas (Good, Rattan, & Dweck, 2012). This is particularly important in terms of decreasing achivement

gaps between males and females. Specifically, research has highlighted the importance of supporting females in deconstructing conceptions relating to innate talent, as relating to mathematics and science, ad emphasising the importance of effort and self-imporvement (Good, Rattan, & Dweck, 2012). This is particular in important in the context of this study given that it was designed and undertaken with a group of 11 females from a lower socio-economic background.

There have been some critics of the implicit theory of intelligence. Furnham, Chamorro-Premuzic and McDougall (2003) did not find a significant relationship between entities versus incremental belief and academic performance. There has also been some discussion on whether the change in mindset can be maintained by the student long term. Other studies highlight the benefits of teaching about the growth mindset but they also note that further intervention may be necessary for long term effects (Aronson, Fries & Good, 2001; Blackwell, Trzesniewski & Dweck, 2007). In-fact Dweck herself has raised this point.

A student's perception of intelligence and, in particular, their own intelligence is an important factor into how they approach learning. It has been noted from Dweck's research that students with a growth mindset approach difficulties when learning as a challenge and are more motivated to learn. In particular, when the growth mindset is promoted in the classroom this encourages students to be more motivated to learn. Dweck has shown the benefits of teaching students about the nature of intelligence and the growth mindset. With this in mind I have developed my research question: Can I, by teaching my students about the nature of intelligence and, in particular, a growth mindset, encourage my students to approach mathematical challenges as areas in which they can learn?

Methodology

Eleven female participants in total took part in the research. All of the participants were in Transition Year (TY - year 4 of post-primary education in Ireland) in a small, inner-city, all girls post-primary school in Ireland. DEIS status has been awarded to the school.

This action research was conducted using a mixed methods approach, with both quantitative and qualitative methods of data collection. I utilised varied data collection instruments when gathering my data. Multiple perspectives were sought in order to facilitate triangulation of data and interpretation of findings (Pine, 2009). The data collection tools are discussed below.

Course Implementation. The research was conducted over six weeks. The students were encouraged to explore their idea of intelligence and how they approach challenges. Throughout the six weeks, a student-centred approach was utilised to teach mathematics.

The following are the specifics implemented in relation to teaching about the nature of intelligence and developing the students' mindset.

Week 1 – Questionnaire and puzzle (discussed below).

Week 2 – Introduction to the nature of intelligence.

Week 3 – Watched Carol Dweck's TED talk and explored Dweck's idea of Mindset.

Week 4 – Completed puzzles individually, discussed how to persist when challenged.

Week 5 – Examples of people with a growth mindset and what they have achieved.

Week 6 – Questionnaire, puzzle and interview (discussed below).

Data Collection Tools:

Questionnaire*:* The questionnaire assessed each student's view of the nature of intelligence and mindset at both the beginning and the end of the course. The questionnaire utilised Dweck's online questionnaire to assess mindset (Dweck, 2006). Eight of these questions assessed participants' implicit theory of intelligence (4 growth mindset and 4 fixed mindset). To answer these questions students ranked their opinion from strongly agree to strongly disagree. A high score represented a better understanding of the idea of the nature of intelligence. Along with Dweck's questionnaire, I used qualitative questions, such as "What is intelligence?", to assess the participant's idea of the nature of intelligence. The questionnaire collected both quantitative and qualitative data.

Puzzle: A puzzle was used as my artefact, this assessed how the students faced challenges. The students completed two different puzzles one at the beginning and one at the end of the research to monitor changes in how they approach challenges. This was achieved by measuring the time the students spent at the puzzle. Each puzzle was a mathematics question set at the same level accordingly in line with the Irish mathematics curriculum and standards. This collected quantitative and qualitative data.

Critical friend: An observation by my critical friend, a mathematics teacher with five years experience. She provided an insight into the validity of my teaching strategies. This is qualitative in nature.

Interview: The interview was conducted after the course was completed. The inverview consisted of 13 questions, see appendix 1. These questions aimed to evaluate a change in the students' idea of the nature of intelligence, mindset and how they approach challenges. I interviewed two students, one from the higher mathematics stream and one from the lower mathematics stream in order to get a representation from both levels of mathematics. This interview collected qualitative data.

Data Analysis

On collecting the data I organized it in a coherent manner. After this, I analyzed the data. When analyzing the qualitative data I followed the constant comparative method (Wellington, 2015). Initially I divided the data into codes. These codes were then grouped into categories. To assimilate the data I revisited it. After this I ensured that I had grouped the data correctly. Following this I made sure the categories were exhaustive and mutually exclusive. Finally, I integrated the categories (Wellington, 2015).

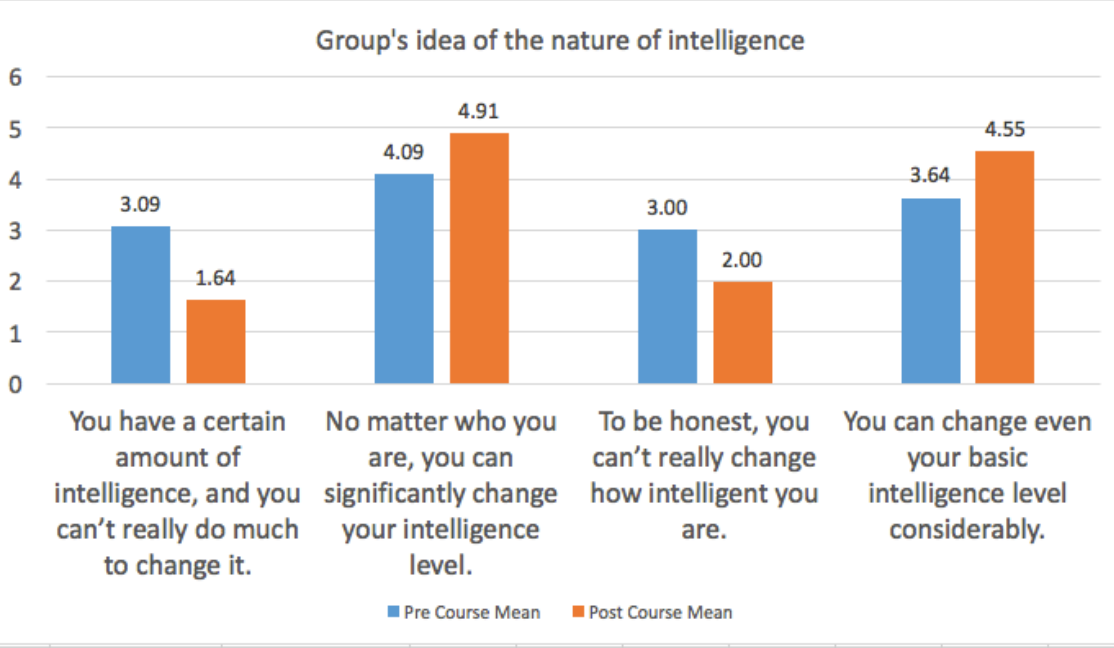
When analyzing the quantitative data, I inserted all of the numerical data into Microsoft Excel and descriptive statistics were utilised to present the data. The growth mindset questions were scored as follows; Strongly Agree 6, Agree 5, Mostly Agree 4, Mostly Disagree 3, Disagree 2, Strongly Disagree 1. The fixed mindset items were reverse scored. A score for the participants' idea of the nature of intelligence was calculated from the items. A score of 8 (i.e. 8 x score of 1 for each of the questions) indicates a Fixed Mindset and a score of 48 (i.e. 8 x score of 6 for each of the questions) indicates a Growth Mindset. Therefore, when analyzing the questionnaires, a high score indicated a growth mindset and a low score was related to a fixed mindset.

Throughout the research all efforts were made to ensure reliability, validity and ethical considerations in line with the National University of Ireland, Galway (NUI Galway) code of conduct.

Results

View of the Nature of Intelligence and Mindset. An analysis of the group's pre and post course idea of the nature of intelligence was carried out. All students' scores were added up and then divided by 11 in order to calculate a group mean score on the mindset questionnaire. Over all there was an increase in the group's idea of intelligence from a pre course mean of 29.18 to a post course mean of 35. This increase indicates a small increase in the group's idea of the malleable nature of intelligence. Figure 1 below displays students' answers to four of the questions asked in the pre and post-course questionnaire to identify their idea of intelligence, with the mean group response indicated.

Figure 1: Change in groups overall idea of the nature of intelligence.



In the graph above a score of a mean of 1 indicates the group strongly disagreed with the statement and a score of 6 indicates the group strongly agreed with the statement. The above graph indicates that students changed their idea of the nature of intelligence after completing the course. For example, in question one 'You have a certain amount of intelligence and you can't really do much to change it', the students disagreed more with this statement on completion of the 6 week program.

Some of the students' pre-course answers to the question, "what is intelligence," are as follows. Student A described intelligence as "everyone is born with a different type of intelligence, it's the area where they stand out in such as, music, art, numbers, physics." While Student B described intelligence as "everybody is intelligent but in different ways some people are intelligent at maths but terrible at music." Student C described intelligence as a measurement of "how much you know." Many of the students expressed the view that intelligence is smartness. Student D's description was "I think intelligence is when someone is smarter than someone else."

In the post course interview Student E described her idea of intelligence pre-course.

Interviewer: What did you think about intelligence before the course?

> Student E: That it's about being smart, and that you just kinda know everything without even trying.
>
> Responses from the post-course questionnaire reflected a more incremental or growth view of intelligence. Student C described intelligence as "a form of knowledge and talent … everyone with different aspects of intelligence and it expands."

In the post course interview Student E described her idea of intelligence post-course.

> Interviewer: What do you think now (after the course), has it (your view of intelligence) changed?
>
> Student E: Yeah it definitely has changed. Intelligence isn't just about being smart. It's about trying to learn more. I guess, like to expand your mind to be open to other things as well. Even if you don't like something to try and understand it.

Table 2 indicates the number of students displaying a growth, mixed or fixed mindset.. It is worth noting that the post-course shows no member of the group had a fixed mindset. Overall, the findings suggest that post-course results indicate the students held more of an incremental view of the nature of intelligence and that there was also a positive change in mindset. This may raise some questions around the sample of students who participated in this course. These students were in a disadvantaged inner city school and it may be that this was the first time that they participated in such an initiative focused on their mathematical development. Also, these students were in TY of their post-pirmary studies which affords them an opportunity to engage with both educational and work experiences throughout the year. Moreover, it is designed to be a non-exmained year and emphasis is placed on a broad educational experience.

Table 2: Mindset of group pre-course and post-course

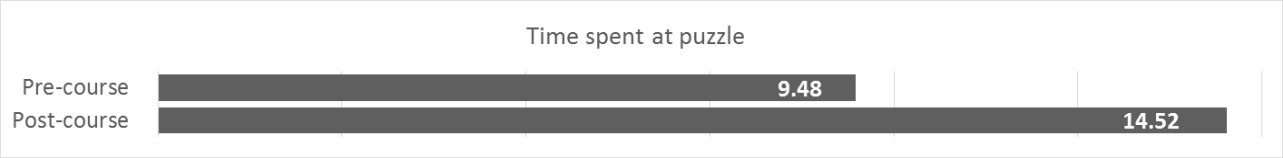
	Growth Mindset	Mixed Mindset	Fixed Mindset
Pre-course	8	1	2
Post-course	10	1	0

Challenges when learning:

How students approach challenges in their learning was measured pre and post-course.

Figure 2 below shows the length of time the students spent on the puzzle given pre-course and post-course. An increase in the length of time spent at the puzzle is seen in the post-course time.

Figure 2: Time spent on puzzle

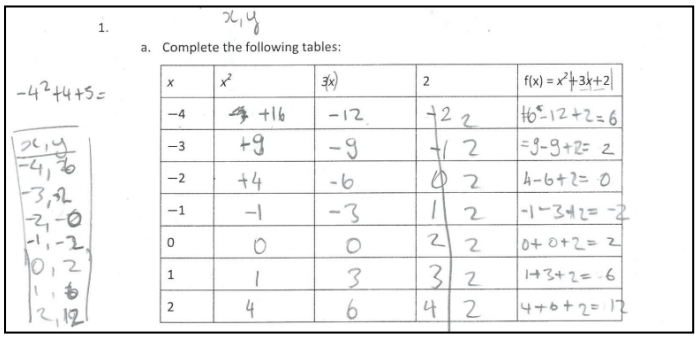


The students who completed the interview commented on how they will now face challenges when completing the state examinations or during their life in general.

> Student F: Yeah you won't have a negative mind about the question before that, you won't give up half as easy as you go through the next question.
>
> Student E: I am a very negative person anyway, so I think that this will change my perspective to be more positive and just instead of saying I can never do this is too hard I'll just say I'll try. I can't do this now.

Figure 3 below, shows student G's post course puzzle. This sample of student work shows how student G did not stop when they made a mistake and persisted with the question.

Figure 3: Student G's work on puzzle 2


1. x, y

a. Complete the following tables:

x	x^2	$3x$	2	$f(x) = x^2+3x+2$
−4	+16	−12	+2 2	16−12+2=6
−3	+9	−9	+1 2	=9−9+2= 2
−2	+4	−6	0 2	4−6+2= 0
−1	−1	−3	1 2	−1−3+2= −2
0	0	0	2 2	0+0+2= 2
1	1	3	3 2	1+3+2= 6
2	4	6	4 2	4+6+2= 12

$-4^2+4+5=$

x, y
−4, 6
−3, 2
−2, 0
−1, −2
0, 2
1, 6
2, 12

These findings suggest that post-course results indicate the students may have approached challenges as areas where they can learn after completing the course.

Teaching Strategies. My critical friend highlighted areas of strength and areas that could be improved in my teaching. She noted the student-centred teaching approach that I implemented in the classroom. In particular, my use of discussion of the topic commenting that "the use of discussion and questioning in the classroom has helped the students understand the topic" (16/11/2015).

In the post course interviews both Student E and F agreed that they enjoyed the teaching methods used throughout the course.

> Interviewer: What was good about the course?
>
> Student E: Watching the video, I think it was one of the first ones, explaining what the difference was between growth mindset and fixed mindset. That was really good I liked that video, I dunno because it was so like informative but not in a boring way, I guess.
>
> Student F: I liked the ending, you know when you like do the problem just like you know when like when you do the problem at the start it would annoy you then you couldn't do something but then when you do it in the end you could just move on it doesn't bother you half as much

The data suggest that the use of student-centred learning helped the students to learn about the nature of intelligence.

Longevity of the Effects of the Course. My critical friend had a concern about the long term benefits of the course, suggesting that the premise of the course may be forgotten over time, if not reinforced. This was also noted in the post-course interview with Student E and F.

> Interviewer: Did you find the course helpful?
>
> Student F: Yep.
>
> Student E: Yeah definitely.
>
> When asked if they had tackled challenges differently the answers were as follows.
>
> Student E: Maybe I have without knowing, but right now no.
>
> Student F: I have not, apart for the challenge at the end. Like it doesn't bother me half as much if I miss a question now.

These findings suggest that the students found the course helpful but there are questions about the long term benefits.

Discussion

This research investigated whether learning about intelligence and, in particular, mindset through a student centered approach would encourage a growth mindset. It also studied if mindset impacted students' approach to challenges, specifically if they approached challenges as areas in which they can learn. The findings from the questionairre and the puzzle suggest that learning about the nature of intelligence and mindset has led the students to approach challenges as areas in which they can learn. These findings are in line with Dweck's research on the connection between student's adopting the incremental theory of intelligence and their attitude to effort (Dweck, 2007).

My research suggests that the students' pre-course view of intelligence tended towards Sternberg (1997) and Gardner's (1983) theory, that intelligence is an ability. I find this result interesting as I was expecting the students to have a classical view that intelligence as a measure of mental ability. This aspect of the students' view of intelligence did not change over the course of the research.

Findings from the research show a change in the students' perceptions of the nature of intelligence and students' mindset. The qualitative data showed a change in the student's idea of the nature of intelligence, from an entity view, describing the idea that intelligence was "how much you know", to the incremental theory, describing intelligence as "…everyone with different aspects of intelligence and it expands". This suggests that the students have adopted the incremental theory of intelligence, that intelligence is malleable and can change over time (Butler, 2000; Heslin, Latham, & Vandewalle, 2005; Plaks, Stroessner, Dweck, & Sherman, 2001). With this change in how they view the nature of intelligence came a change in the students' mindset. Moreover there was not a large change in the student's mindsets, but in the post-course analysis of mindset there were no students with a fixed mindset. These findings are in line with Dweck's (2007) findings. Also, given that this was undertaken with an entirely female sample, and in the context of mathematics eductaion, this may have a significant impact on how students perceive their mathematics ability for future studies (Good, Rattan, & Dweck, 2012). With this in mind it is important to recoginise the limitations of this study such as the small sample size of 11 and the short time frame of the study.

The research found that there was a change in how the students approached challenges. This can be seen throughout pre-course and post-course analysis of the findings and the students' description of challenges in the interview. Both students agreed that how they will face challenges has changed. One stating she "won't give up half as easy." This result is also seen in the change in the length of time the students spent on the puzzle pre and post-course. From the example of the students work in figure 3, you can see that the student learned from her mistakes. From these findings I believe that the students were stretching themselves and seemed to approach challenges as areas in which they can learn. This

correlates to Dweck's findings that students with a growth mindset believe they can learn from mistakes (Dweck, 2012).

I aimed to research if I could teach students about the nature of intelligence. The findings suggest that the students change their idea about the nature of intelligence. I implemented student-centred teaching approaches over the course. The data suggests that these teaching methods were effective. This was highlighted by my critical friend and in the post-course interview with the students. The importance of teaching students about the nature of intelligence is central to Dweck's theory of mindset (Dweck, 2012). Overall the findings suggest that I have taught students about the nature of intelligecne using a student-centred teaching approach.

The research found that the students changed their mindset but it is not clear if over time the students will revert back to their original view of intelligence. Observations from my critical friend questioned if there would be long term effects of the course. From Aronson et al.'s (2001) study and Blackwell et al.'s (2007) we see the value of teaching the growth mindset but it also highlights to have a long lasting effect further intervention may be necessary.

Conclusion

This research aimed to identify if teaching students about the nature of intelligence and, in particular, a growth mindset, encouraged my students to approach mathematical challenges as areas in which they can learn. This research was inspired by Carol Dweck's (2007) work on mindset and its benefits for learning in the classroom. The findings of my research suggest that after completing a course on the nature of intelligence the students approached challenges as areas in which they can learn. Although this was a positive result we are aware of the limitations of the research; the size of the sample, an all female sample and the short time frame of the research, and would question if these results would be maintained.

I have learned the benefits of teaching students about the implicit theory of intelligence and mindset. From my research I saw the impact this had on how students approached challenges in their learning. I believe that changing how female students approach challenges is key to helping them to achieve their full potential in mathematics. The results of the research have shown me that it is important to teach students about mindset. It has also shown me the benefits of knowing these psychological concepts. I have a greater appreciation of the importance of educational psychology in the classroom. Although the results have limitations I can conclude that teaching about the nature of intelligence is an important aspect of professional practice. It would be beneficial to conduct further research to see if growth mindset has the potential to help students learn in all subjects, not only in

the mathematics classroom. While the results of this short term research are promising, further research needs to be conducted to ascertain the long term effects of learning about mindset in the mathematics classroom.

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Appendix A

Interview Questions

1. What did you think intelligence was before we started the course?
2. Did you learn anything about intelligence, are there any specific things you have learned?
3. What did you think about ability before we started the course?
4. Did you learn anything about ability, are there any specific things you have learned?
5. Had you heard of Mindset before the course?
6. Did you learn about Mindset, are there any specific things you have learned?
7. Do you think you have changed your Mindset?
8. Do you think you have used it has it helped you with any challenges over in the last six weeks?
9. Do you think that the course was helpful?
10. Do you think the course will help as you complete your leaving cert?
11. What was good about the course?
12. What was bad about the course?
13. Would you recommend it to your friends?

Appendix B

Questionairre (Dweck, 2006)

Please show how much you agree or disagree with each statement below by ticking the option that corresponds to your opinion.	**Strongly Agree**	**Agree**	**Mostly Agree**	**Mostly Disagree**	**Disagree**	**Strongly Disagree**
Q1. You have a certain amount of intelligence, and you can't really do much to change it.	○	○	○	○	○	○
Q2. Your intelligence is something about you that you can't change very much.	○	○	○	○	○	○
Q3. No matter who you are, you can significantly change your intelligence level.	○	○	○	○	○	○
Q4. To be honest, you can't really change how intelligent you are.	○	○	○	○	○	○
Q5. You can always substantially change how intelligent you are.	○	○	○	○	○	○
Q6. You can learn new things, but you can't really change your basic intelligence	○	○	○	○	○	○
Q7. No matter how much intelligence you have, you can always change it quite a bit.	○	○	○	○	○	○
Q8. You can change even your basic intelligence level considerably.	○	○	○	○	○	○

What is intelligence? Answer this question in the space below.