Differentiated homework: Impact on student engagement

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Abstract

This paper describes a mixed methods practitioner research study that aimed to enhance student engagement with homework. Based on a comprehensive literature review and data from a pre-study questionnaire, a differentiated homework strategy was designed by the teacher researcher. Students were assigned homework once a week to allow them to balance homework requirements more successfully with out-of-school activities. They were given a choice of three tasks each week, ranging from lower to higher difficulty levels. Task difficulty levels were not stated, nor were tasks ordered by difficulty. Students' attitudes towards homework improved over the course of the study and completion rates increased to nearly 100 per cent. Task choice and effort were recorded. The analysis paid special attention to similarities and differences in the impact of the strategy on students of different ability levels. Suggestions for further development of differentiated homework strategies and associated research are provided in the conclusion.

Preface

This practitioner research study was conducted by a student teacher studying on the Professional Master of Education (PME) at the National University of Ireland Galway during his final 10-week block of school placement. The project is highly innovative in the Irish second-level school context where a high-stakes terminal examination system has led to significant homework pressures for students and teachers alike. Findings from this study have not only influenced the teacher researcher's own attitude towards, understanding of, and professional practice in relation to homework but also those of many students who followed him in the School of Education at NUI Galway. Collaborative practitioner research forms an integral part of all initial teacher education programmes at NUI Galway allowing student teachers and their supervisors to co-create practical research studies that are 'in tune with their teaching contexts, needs and capacities' (Eberhardt & Heinz, 2016; Heinz et al., 2017).

For further information about initial teacher education in Ireland see Heinz, 2014 & Heinz, Keane & Foley, 2017. Further examples of student teachers' practitioner research work include O'Mahoney & Heinz, 2016 and Duffy & Heinz, 2019.

Introduction

If we didn't learn about the best practices regarding homework, students would be wasting valuable at-home time, when learning is critical to student achievement (Paschal et al., 1984).

My 2-year postgraduate second-level initial teacher education programme required me to complete school placement in two different schools. I taught in one school for fourteen weeks during year 1 of the programme and for 21 weeks in another school during year 2. While the schools differed in many aspects, one of the greatest challenges for me related to a drastically different experience with regard to students' compliance with homework. Coming from school 1, where all students completed the homework I assigned to them every day, with only the occasional exception, I was perplexed and, as time progressed became more and more frustrated, with students' poor attitudes towards, and low completion rates of, homework. Every day, many students turned up in class without their homework, frequently offering excuses such as forgetting books and copies. Even those who completed their homework seemed to do so with as little effort as possible.

It was my frustration and my desire to take action – to find a solution to the 'homework problem' – that inspired this research project. I realised that what we had heard in lectures and workshops – that learning and teaching is complex and that no two schools are the same – was true. It was clear that the homework strategy that had worked in my first placement school did not automatically lead to success in this new context. I realised that I needed to explore the problem in order to come up with a well-founded action plan.

After conducting a comprehensive literature review and taking into account findings from a pre-study questionnaire exploring students' perceptions and experiences of homework, I designed and implemented a differentiated homework strategy over a period of 6 weeks, collecting data throughout. In designing this mixed methods practitioner research study I was guided by the following research questions:

- What are students' perspectives on and experiences with homework (benefits, challenges, available supports)?
- What impact do differentiated homework strategies have on student engagement?
- Can a differentiated homework strategy help to increase students' homework completion rates?
- When given a choice, do students choose to complete homework tasks that are appropriate for their ability levels?

Literature review

The Benefits of Homework

Alongside classroom instruction, active teaching methodologies, and the students' engagement during lessons, homework has been identified as one of the central factors related to student achievement (Cooper, Robinson & Patall, 2006; Keith et al., 1993; Paschal, Weinstein and Walberg, 1984). Research has shown that the highest performing students spend more time engaging with homework activities compared to average students (Epstein & Van Voorhis, 2001). High achieving students may, indeed, require additional challenges outside of the prescribed homework in order to gain the most benefit. According to Epstein and Van Voorhis (2001), high achievers exhibit a willingness to exert more effort into task, which can, in turn, leave them feeling unchallenged if not catered for correctly.

As well as providing positive academic merits and enhancing overall student study skills, homework supports the development of non-academic skills such as increased self-direction, self-discipline, time management, and independent problem solving. It is, furthermore, argued that homework can increase levels of parental engagement and input in schooling (Cooper, 2008). Comparisons between low- and high-achieving students, showed that the latter have superior ability to 'manage their workspace, budget time, handle distraction, monitor motivation, and control their emotions while doing homework' (Xu, 2009). While it is not completely clear whether the engagement in homework activities can support the development of such skills or whether homework activities are weighted towards students with a natural predisposition for such skills, it is important to note that there is a 'positive correlation between homework activities and self-efficacy, responsibility for learning, and delay of gratification' (Bembenutty, 2011).

The Downsides of Homework

Numerous studies highlight the drawbacks of students being assigned work outside of the classroom. Some researchers draw upon the idea that homework can play a large role in ostracising students who are already at a disadvantage. Accordingly, students from socio-economically disadvantaged backgrounds may encounter difficulties when completing their homework due to inequities in their personal lives or their home environments (Kohn, 2006). Circumstances outside of students' control, frequently related to extra responsibilities in the home, such as chores or caring for family members, may affect students' ability to complete their homework (Cooper 2006; OECD, 2014; Eren & Henderson, 2011).

Despite evidence highlighting the academic benefits of completing homework and spending time engaging with it (Cooper, 1998), homework can, furthermore, cut into students' personal and family time. Trautwein (2007) argues that time spent on homework is not an effective measure to predict academic achievement, as low achieving students may spend more time doing assignments as a result of ineffective or unenthusiastic working styles. Assigning the students too much homework can stagnate their progress if they feel overwhelmed by the pressure of being under time constraints (Fernández-Alonso et al., 2015), thus diminishing its effectiveness to the point of being counter-productive.

While high achieving students can benefit greatly from extra homework, the opposite effect is noted for lower preforming students who are, often, predisposed to encountering more challenges when completing their homework (McNary, 2005; Bryan, Burstein & Bryan, 2001; Bryan & Nelson, 1995; Bryan, Nelson & Mathur, 1995; Epstein et al., 1993). Multiple difficulties can assert themselves during the homework completion process, from understanding or taking down the homework, to bringing the correct resources home, ensuring they have enough time to complete the task, organizing the required materials, sustaining concentration, remembering where they left their work, and then remembering to take it back to school (Bryan et al., 2001, p. 168). Due to issues such as these, students with learning disabilities also often hold negative attitudes towards homework (Bryan & Nelson, 1995; Bryan et al., 1995; Epstein et al, 1993).

Strategies to Increase Homework Completion

According to Kohn's research, teachers are often not adequately aware of, or do not have the time to prepare for, the difficulties that their students face when trying to complete tasks outside of the classroom. As a result, they are often unable to create homework tasks that cater for the needs of all their students (Kohn, 2006).

Providing students with homework assignments that are varied, differentiate expectations for students of different ability levels, and offer the students the chance to choose between options are central concepts when trying to trigger student engagement (Ames, 2009; Cooper, 2006). Homework needs to be very clearly explained using simple language and should be written and left on the board for the duration of the lesson (McNary et al., 2005). It is good practice to provide the opportunity for students to begin their assignments at the end of the class to afford both, the student and teacher, the opportunity to seek and provide clarification and assistance (Cooper & Nye, 1994). The homework task should normally be directly linked to material that was covered in class. Assignments that are exploratory and not based on class material need to be

accompanied by appropriate resources (Redding, 2000).

A number of studies indicate that students engage more with exercises that are 'graded, commented upon, and discussed in class by teachers' (Cooper & Nye, 1994; Jenson, Sheridan, Olympia & Andrews, 1994; Keith, 1987; Protheroe, 2009; Redding, 2000). Thus, homework should be corrected promptly, and meaningful feedback should be provided. When the teacher emphasises the importance and value of homework, student motivation to complete the task to the best of their ability can be enhanced. Constructive engagement with homework can also afford the teacher valuable insights into student thinking and understanding.

In conclusion, it is evident that homework can have both, advantages and disadvantages for learning and learners. Ultimately, an educator should not assign homework tasks as a matter of routine. Instead, homework activities should have a clear purpose, offering students opportunities to revise, continue and/or extend their learning. This study aims to utilise the findings from previous research as well as data from a pre-study student questionnaire to devise a more authentic, meaningful and effective homework strategy to benefit all learners in a mixed-ability Geography class.

Conceptual Framework

The design of a differentiated homework approach was underpinned by my understanding of student engagement as a multi-dimensional concept impacting all student-teacher interactions, learning and task effort. I was interested and paid attention to three dimensions of student engagement - behavioural engagement, cognitive engagement, and emotional engagement (Fredericks et al., 2004).

In order to assess the effectiveness of differentiated homework strategies I collected data to explore each engagement dimension. Behavioural engagement is related to students' 'positive conduct, such as following the rules and adhering to classroom norms, as well as to their involvement in academic tasks and learning, including behaviours such as effort, persistence, concentration, attention, asking questions, and contributing to class discussion' (Fredericks et al. 2004, p. 62). In this study, homework completion and task persistence were measured to explore the impact of the differentiated homework strategy on behavioural engagement with homework. To this end, I monitored students' homework completion rates and recorded every time homework was assigned during the six-week study.

Cognitive engagement is associated with how students 'feel about themselves, their work, their skills, and the strategies they employ to master their work' (Metallidou & Viachou, 2007). It includes a focus on students'

'investment in learning, which involves self-regulation, being strategic, or the desire to go beyond the requirements, and a preference for challenge' (Fredericks et al., 2004, p. 63). It, thus, relates to the challenges students' choose to embrace and, to an extent, to the quality of the work that students produce. In this study, assessment criteria for effort and quality of work were established in line with the Junior Certificate Geography marking scheme (2016). Each student was awarded an indicator of effort for each completed homework task and this was recorded as either 'good effort', 'some effort', or 'little to no effort'. In analysing the students' completed homework, I gauged effort by looking at both the quality and quantity of students' answers. For example, a 10 mark question requires 5 significant relevant points at 2 marks each. Naming and identifying would receive 4/10 available marks, while explaining and discussing would get the remaining 6 marks. More developed answers were deemed indicative of higher effort levels. Students who were deemed to have made the most effort provided more information than necessary to achieve full marks under the Junior Cert Geography marking scheme.

Students' choices of homework tasks were also recorded and the match (or mismatch) between students' choices (in terms of task difficulty level) and their ability levels was analysed. Before beginning the implementation, I recorded students' ability levels based on their average grade scores. The differentiated homework tasks were designed to reflect varying levels of difficulty. As part of the analysis, I recorded students' choice of homework tasks alongside their ability levels so as to establish whether students of higher ability chose more difficult homework tasks.

Although there is debate amongst the literature as to what constitutes emotional engagement, for the purpose of this study, it is defined as 'the extent that students feel a sense of belonging, and the degree to which they care about their school and their work' (Sciarra & Seirup, 2008). I explored students' emotional engagement through two questionnaires, one before and one after the study.

Methodology

Context and Participants

I conducted this research study with my 1st year (12-13 year olds) Geography class. The class consisted of 28 students containing 17 boys and 11 girls. 26 students participated in the research. Six participants of the study had recognised learning difficulties, with two of these receiving additional one-to-one support during school hours, and one member of the class had a special needs assistant in class at all times. Five of the six students with learning difficulties had an average grade score which placed them in the low achieving category. Seven members of the class had an average grade score of 85% or

above, placing them in the high achieving category. The remaining fourteen students had grades averaging between 55%-85%.

I implemented the research between 27th of February and 8th of April 2018. During these weeks, we followed the Junior Cycle Geography curriculum and used the 'New Complete Geography' (Hayes, 2015) textbook, supported by additional teacher-created resources. During the research period, we finished the unit on the sea and began a new topic of glaciation.

Data Collection

I collected quantitative data for behavioural engagement and students' answer choices once a week over the six-week study period. This involved checking each student's homework individually, recording if they had the homework completed or not, and recording which task they chose. Students were given the choice between three homework tasks of varying difficulty; from easy, to moderate, to difficult. The tasks were categorised by difficulty levels based on Anderson and Krathwohl's (2001) modifications of Bloom's original taxonomy (Bloom and Krathwohl, 1956). This model denotes a continuum of increasing cognitive complexity, which ranges from lower order thinking skills to higher order thinking skills. The order of easier to more difficult homework tasks was randomised and changed each week so as to avoid students recognising a pattern. The homework tasks assigned are represented in Appendix 1. To ascertain student effort levels (cognitive engagement) I assessed all copies at the end of the six-week study.

I decided to explore students' emotional engagement through a mixed-methods questionnaire prior to the study, and again once the study concluded. The questionnaires were designed with open-ended questions at the beginning, followed by the closed answer questions, in order to elicit responses that were 'spontaneous and unbiased' (Lazarsfield, 1944). As this research was iterative in its nature, the pre-study questionnaire proved instrumental for the design of the study as the gathered data enabled me to gain a deeper and contextualised understanding of the reasons for non-completion of homework as well as of my students' perceptions and experiences with homework. The insights I gained from this initial analysis supported me in the development of a focused and context appropriate differentiated homework strategy aimed at encouraging both, participation and effort levels. After completing the study, I compared data from both questionnaires (pre- and post-implementation) to assess the impact of the intervention on students' perceptions and experiences (emotional engagement).

Study Design

The data collected from the pre-study questionnaire, the effects of the differentiated homework approach, and the post-study questionnaire were collated and graphed using excel. The analysis of the pre-study questionnaire allowed for the identification of several key themes related to homework non-completion which, in turn, informed the design of the differentiated homework strategy: time constraints, lack of understanding, and motivation.

Following the literature review and analysis of the pre-study questionnaire, I implemented the following homework strategy with my 1st Year Geography class:

- Homework was assigned once a week, as opposed to three times.
- Students were required to choose one option from a menu of three homework tasks. Each week, homework tasks were designed to challenge students at various difficulty levels (hard, medium, easy), using Bloom's Taxonomy Pyramid (Bloom and Krathwohl, 1956) and the Cognitive Processes and Knowledge Dimensions (Anderson and Krathwol, 2001). Task difficulty levels were not stated, nor were tasks ordered by difficulty. Students were free to choose whichever task they wanted to complete.
- The homework was assigned ten minutes before class ended, allowing the students to begin their task and to ask questions.
- Homework was corrected both orally and through written comments, during a ten-minute period at the beginning of the next class.
- If homework was not completed, there would be no consequence the first time. On the second occasion, students would complete their homework during school time. A third incident of non-completion would lead to detention and, finally, parents would be contacted (steps outlined are based on students' responses to relevant questionnaire item eliciting their opinions regarding appropriate consequences for homework non-completion).

For the purpose of this study, academic ability was determined based on students' average grades achieved across three class tests undertaken prior to the study. Students achieving an average of above 85 per cent were assigned an A grade to identify them as high achievers, those with median grades between 55-85 per cent were assigned either C or B grades indicating average to above average performance, and D grades were assigned to low achieving students who held an average grade of 55 per cent or below throughout the year. Average grades were chosen in this instance as 'grades are a measure of achievement and are readily interpretable by parents, students, and school personnel' (Keith, 1982). The caveat to this, however, is that grades can vary from teacher to

teacher and, therefore, may not be completely reliable as an indicator of student ability.

Informed consent was received from the parents and assent from the students. To ensure anonymity and confidentiality, I placed students in a seating plan and replaced their names with numbers for the purpose of recording homework completion and task choices. The questionnaires were carried out anonymously. The research received full ethical approval from the NUI Galway School of Education Research Committee.

Findings and Analysis

Students' Self-reported Homework Completion Rates

Over the course of the study, there was a marked shift in the students' self-reported homework completion rates (see Figure 1) with the percentage of students reporting that they completed all their homework increasing from 50 to 92 per cent. As a result, ten more students reported completing all their homework in the post-study compared to the pre-study questionnaire.
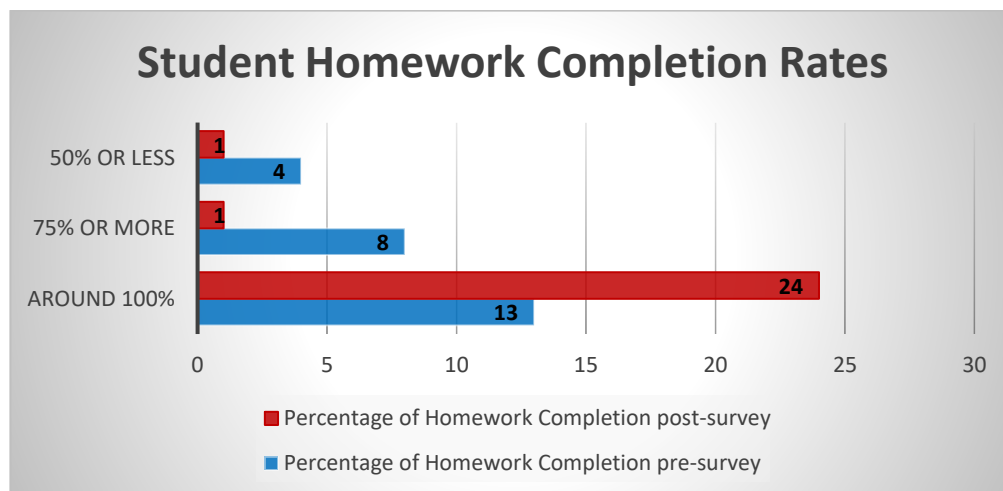

Figure 1: Student self-assessment of homework completion rates before and after the research project (Number of students indicating that they complete 100%, 75% or 50% or less of homework tasks).

Students' Perception of and Experiences with Homework (emotional engagement)

Attitudes towards homework. Similar to student completion rates, students' attitudes towards homework also indicated a positive change. The pre-questionnaire indicated that students held primarily negative opinions towards homework with 73 per cent outlining their dislike and only 27 per cent holding

positive viewpoints. Alongside highlighting their dislike, 50 per cent of the students highlighted the time-consuming nature of the homework as the primary reason for their negative perspective. Following the intervention, students no longer mentioned the time constraints, and 70 per cent of students indicated that they preferred the new homework strategy.

While the students preferred the new homework strategy, the majority of students continued to express negative attitudes towards homework. However, the number of students holding negative views reduced from 19 to 14 while the number of those with positive attitudes increased from 7 to 12.

When responses to an open-ended question exploring students' reasons for non-completion were analysed thematically, four key themes emerged: involvement in activities, time constraints, lack of understanding, and too much homework from other teachers. Prior to the study implementation, 'activities' (N=8) and 'time constraints' (N=8) were the most common reasons provided by students followed by 'too much homework from other teachers' (N=4) and 'lack of understanding' (N=4). The post-questionnaire indicates that the intervention had an effect on students' perceptions, with time constraints only mentioned by one student and lack of understanding eliminated as a cause for non-completion. Interestingly, these reductions had an impact on the prominence of the other reasons provided with 'activities' (N=16) and 'too much homework from other teachers' (N=9) mentioned now by nearly twice the number of students. The data serves to highlight the importance for the teacher to pay attention to students' lives outside the classroom.

Factors effecting homework completion. The amount of activities that the students of this class were involved in outside of school is represented in Figure 2. In response to the question on what activities they are involved in outside of school, 92 per cent reported that they engage in some form of after school activity. These activities included, but were not limited to, hurling, Gaelic football, soccer, rugby, water-polo, golf, hockey, horse riding, Irish dancing, speech and drama. 85 per cent of the students involved in out-of-school activities specified at least two of these after school activities, while 70 per cent were involve in three activities or more.
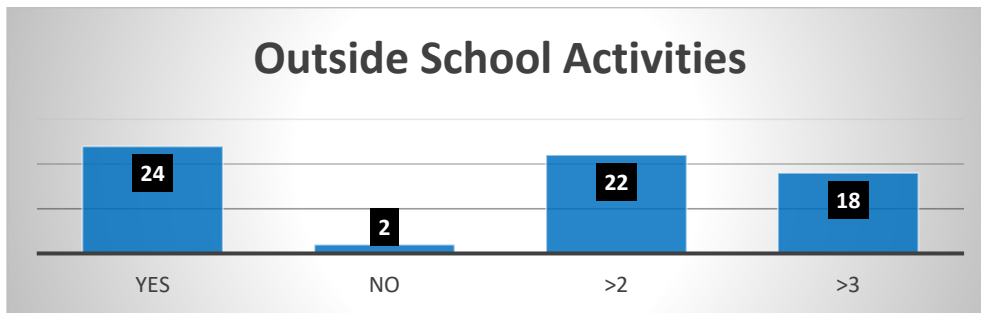
Figure 2: The number of students who reported being involved in activities outside of school time.

Time spent on homework. The distribution of time spent on homework was nearly identical to the distribution of high, medium and low achievers. As the questionnaires were conducted anonymously it is impossible to identify which students fall into which category.

The data showed that 60 per cent of students (N=15) spent between 1 and 2 hours completing all of their homework every night, falling in line with the amount of time recommended by Cooper (2006). The remaining 40 per cent of students were evenly split between less than 1 hour (N=5) or more than 2 hours (N=5). As time was the primary reason that was initially cited by students holding negative opinions in relation to homework, it is interesting that 20 per cent of the students spent more than the 1-2 hours a night recommended by the school.

Feedback on / Support with homework. Students were also asked if they received written comments and/or suggestions from teachers for their homework. As demonstrated in Figure 3, the intervention led to a recognised increase in written teacher feedback for student homework. The phrasing of this question may have posed a limitation to the analysis as, although the teacher researcher corrected and provided feedback to each student individually, the question in the post-study questionnaire was not adjusted to specifically focus on feedback received on Geography homework. Thus, some students may have felt this question was more generally focused on teacher comments received on their homework across subjects. While 16 students reported that they had received comments on their work, 10 students still felt that they did not receive any or that they only sometimes received comments from teachers.
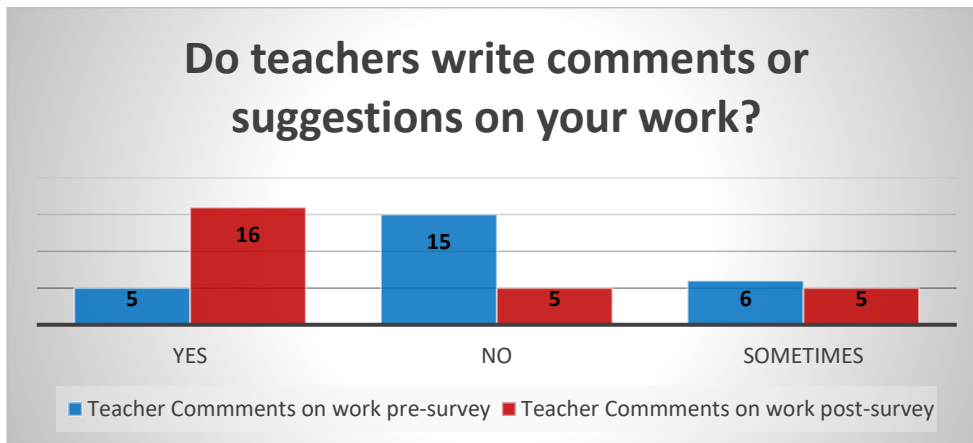
Figure 3: Teacher comments or suggestions on work.

Only 32 per cent of students reported that they had somebody to help them with their homework if they were finding the work difficult or unclear, while 24 per cent indicated that they 'sometimes' received help. 44 per cent of students reported receiving no help with homework. This raises important questions about the availability of parental and/or other out-of-school support with homework.

Student perspectives on appropriate consequences for homework non-completion. Figure 4 illustrates student perspectives on appropriate consequences for homework non-completion which were ultimately translated into a student inspired homework policy. Surprisingly, only 26 per cent of the students believed that there should be no consequences for not completing their homework tasks. 57 per cent of students specified that non-completion of homework should be reprimanded by either: completing it during school time, detention or contacting home. It is clear from this that the majority of students believe that everyone should complete homework tasks. On the basis of this data, it was decided that the new homework implementation policy stipulated a 4-strike procedure. On the first incident of non-completion a warning would be given. Further incidents would require students to do the work during school time, receive break-time detention, and, for a fourth repeated incident, contact would be made with students' parents. It is interesting to note that during the implementation of the study no student ever reached two incidents of homework non-completion.
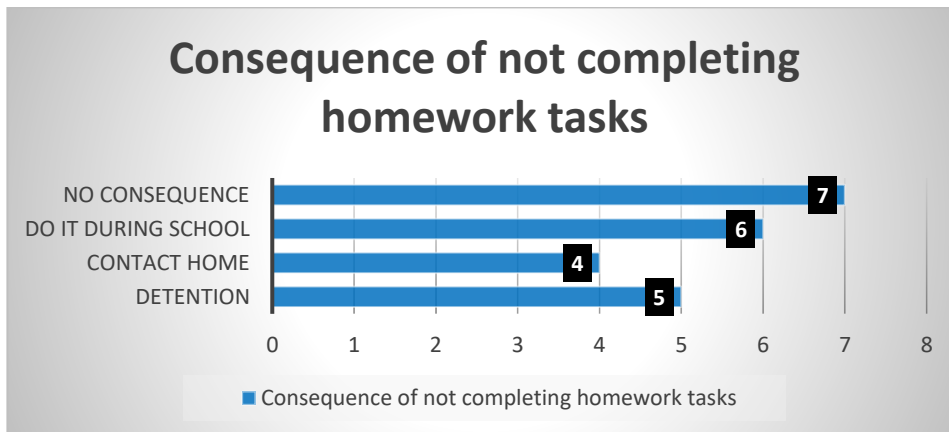
Figure 4: Students' perspective on appropriate consequences for those who don't complete homework tasks.

Actual Homework Completion Rates over Study period (behavioural engagement)

High achievers. Completion rates for the high achievers was 100 per cent. This highlights that the high achievers are behaviourally very engaged. With the exception of absences, the students within this group completed all their assigned homework all the time. This result supports the relationship between the amount of homework students do, and their achievement outcomes (Cooper, 2006).

Low achievers. The low achieving group of students were equally as engaged, behaviourally, as the high achievers and also achieved a 100 per cent completion rate over the course of the study. The increase in the level of engagement from this group is particularly encouraging given that various difficulties have been identified in the literature that can adversely affect the engagement of lower achievers.

Medium achievers. The least compliant group was the group of medium level achievers with 5 students from this category not complying with the homework strategy during the 6-week period. This accounts for almost 1 student per week not completing the homework task.

However, overall, the study achieved a very high homework completion rate of 96% (26 students x 6 weeks=156 homework tasks – 5 non-completion incidents overall). The medium ability group of students accounted for the largest percentage of participants and was, therefore, the most varied. In light of their larger proportionate size, it is not surprising that a higher number of non-completion incidents was recorded for this group. The finding does, however, emphasise the importance of paying attention to the engagement and progress of mid-level ability students, so that this often comparatively large, and

perhaps less demanding group of students is not overlooked and does not fall short of achieving their potential.

Student Homework Task Choice (cognitive engagement)

High achievers. The high achieving students were the most likely to opt for the harder questions. In fact, two students completed all the questions all of the time. This was a very interesting finding as it highlights high achieving students' desire to challenge themselves when given the opportunity. These results support the argument that high achieving students benefit from additional challenges and exercises, and a differentiated strategy can be an effective way of achieving this.

Medium achievers. Mid-level ability students engaged predominantly in the hard and medium level tasks. C-level students were the most varied of the group, with their answer choices ranging from hard, to medium to easy.

Low achievers. This group of students was the most likely out of all the cohorts to choose the easy to medium options. They also showed an overall lower engagement level reflected by shorter to minimal answers.

Quality of engagement (cognitive engagement)

High achievers. The high achieving students were the most likely to provide the most detail in their answer and achieve the highest-grade marks. This would indicate that the high achievers are not only complying with homework tasks but also making the most effort at them. This ties in with the benefits of homework identified in the literature review, highlighting that high achievers exhibit a willingness to exert more effort (Epstein and Van Voorhis, 2001).

Medium achievers. This cohort was the most variable of all the groups. At the higher end of the spectrum, the B-level students were very engaged as they made an overall strong effort and generally completed the tasks to a high standard. The C level students were comparatively less engaged as they were more likely to engage at a more superficial level with less detail provided in their work.

Low achievers. Of all the cohorts, the low achieving students were the most likely to submit homework of lower quality. While they always completed their homework, they were not completing it to the same standard as the high or medium achievers, even when accounting for the lower cognitive level of the task. When reviewing and correcting the work of the students within this category, a commonality between the students was short and/or incomplete

answers, which translated into lower marks compared to the higher achievers. While no reliable conclusions can be drawn from this observation, it seemed as if students were rushing through the homework and writing down their answers as quickly as possible during the 10-minute window at the end of class.

Discussion and Conclusion

Exploring students' experiences with and perceptions of homework – it's purpose as well as reasons and perceived appropriate consequences for non-completion – proved to be very worthwhile as it afforded me an invaluable insight into my students' perspectives on homework. Indeed, the realisation that students can experience significant time pressures and challenges with regard to balancing homework demands with multiple out-of-school activities made me re-evaluate not only the nature of the homework tasks I assign but also the strategy of assigning homework. To allow my students more flexibility, I assigned homework once a week rather than after each of the three weekly lessons. This led to a small decrease in the overall time required to complete homework. Most importantly, however, it gave my students the freedom to manage their own time and balance homework with various out-of-school activities more successfully and their appreciation of this new freedom was very noticeable.

Other contributors to homework non-completion identified in the literature as well as as part of my study were i) students being unsure of what was expected and/or not understanding homework tasks, ii) lack of teacher feedback on homework, and iii) having no help available at home. With the exception of home support, I tried to address all of these identified barriers in the design of our new homework strategy. I allowed students to start their homework in class so as to ensure that they understood tasks and/or had the opportunity to seek clarification. I increased homework correction time in class and provided more written feedback on homework. Again, it was clear that students appreciated this and that the increased attention we paid to homework corrections as a class, together with increased levels of teacher feedback on individual work, raised the value that many students put on homework and, with that, their motivation.

The data gathered from this study provides strong evidence of a positive impact of the differentiated and supported homework strategy on students' engagement with homework. It also suggests that, when given a choice, students choose homework tasks appropriate for their level. Many students changed their opinions on homework from negative to positive, and all students successfully achieved learning outcomes, although at differing levels.

While I am delighted that the problem of homework non-completion has, therefore, been resolved nearly completely, the study has raised a number

of new questions. Particularly in terms of students' emotional and cognitive engagement, I am wondering whether negative attitudes towards and effort put into homework correlated with ability levels? While the results are encouraging with regard to the high completion rates observed for lower-achieving students, I sometimes wondered whether these students were motivated to complete the homework so as to avoid sanctions, thus choosing the easiest task and exerting the least effort. During the implementation of the differentiated homework task I took special caution not to identify the cognitive engagement level required for the different tasks so that students could choose freely without being labelled as low or high achievers. Did students, however, know which were easier and more difficult tasks anyway? And how did they feel about their choices? What influenced their task choice and why did students of lower ability levels continually choose the easiest tasks? Did having a choice allow them to successfully complete their homework (boosting their learning and self-esteem) or did it allow them to exert less effort (resulting in less progress and learning gains)?

I am aware of many limitations in this study which cautioned me to explore the results critically and with care so as not to misinterpret them. Most importantly, I now understand that measuring student effort is a very challenging task. Effort can't be captured through the analysis of quantity or quality of what ends up on a students' page alone. Especially with regard to homework, it can be invisible to the teacher and we must be careful not to jump to conclusions based on unfounded assumptions. I am aware that I need to be careful not to confuse quality or quantity with effort – the former two being very incomplete measures of the latter. Indeed, it is conceivable that quality may be more strongly related with students' ability than with their effort. Students attempting even the easier tasks and even at a lower level than their higher achieving counterparts may still be an indicator of improved effort – which, in turn, may be a springboard for the development of greater cognitive engagement in the longer term. However, it is also possible that students of lower ability levels, who may have come to hold low expectations of themselves, may welcome the differentiated strategy as a path to less sanctions and less effort allowing them to prioritise out-of-school activities in their spare time.

Having engaged with research showing that the lowest preforming students hold the most negative attitudes towards homework (Bryan & Nelson, 1995; Bryan et al., 1995; Epstein et al, 1993) and, subsequently, exert the least effort, I feel that it is important for teachers to conduct further research to explore the experiences of lower achieving students with differentiated homework. After reflecting on my experience, I believe that there may be a lot more teachers can do through the use of differentiated homework strategies to enhance the cognitive engagement and outcomes for the lowest performing students.

In this study, the lowest achieving students always chose the easiest tasks which, by design, were repeatedly targeting lower order thinking skills. Future research on differentiated homework strategies could explore whether increasing the levels of difficulty over a period of time for *all* students can enhance cognitive engagement and performance for lower achievers. Paying attention to the multidimensional concept of student engagement, I recommend that future studies address the following research question: How would a differentiated homework strategy designed to increase difficulty levels for lower achieving students, starting with lower order and progressing to higher order tasks, impact students' homework completion rates, task choices, effort and quality of work?

Overall, this study has allowed me to experience the power and reap many benefits associated with practitioner research. Firstly, the study has challenged me to explore (and it has significantly raised my awareness of) my students' perspectives, experiences and learning needs (Kosnick, 2000; Rock & Levin, 2002). Through my engagement with educational literature in the areas of homework, curriculum planning, engagement and differentiation, I have developed a greater appreciation of learning theories and developed further my own personal theory of teaching (Monroe et al., 2007; Ostorga & Lopez, 2009). Last but not least, the experience of planning and implementing systematic practitioner enquiry, together with the realisation that small changes in classroom practice can significantly impact student engagement, have given me confidence and awareness of the value of reflection, action and experimentation (Duffield & Townsend, 1999; Moore, 1999; Rock & Levin, 2002).

References

Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., Raths, J. & Wittrock, M. C. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives, abridged edition. *White Plains, NY: Longman*.

Bangert-Drowns, R. L., Kulik, C. C., Kulik, J. A., & Morgan, M. (1991). The instructional effects of feedback in test-like events. *Review of Educational Research*, *61*(2), 213–238.

Beegle, D. M., Ellis, D., & Akkary, R. (2007). *See Poverty--be the Difference!: Discovering the Missing Pieces for Helping People Move Out of Poverty*. Communication Across Barriers, Incorporated.

Bembenutty, H. (2011). The last word: An interview with Harris Cooper-Research, policies, tips, and current perspectives on homework. *Journal of Advanced Academics*, *22*(2), 340-350.

Bryan, T., Burstein, K., & Bryan, J. (2001). Students with learning disabilities: Homework problems and promising practices. *Educational Psychologist*, *36*(3), 167-180.

Cooper, H., Lindsay, J. J., Nye, B., & Greathouse, S. (1998). Relationships among attitudes about homework, amount of homework assigned and completed, and student achievement. *Journal of educational psychology*, *90*(1), 70-83.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987–2003. *Review of educational research*, *76*(1), 1-62.

Davis, H. A., Summers, J. J., & Miller, L. M. (2012). *An interpersonal approach to classroom management: Strategies for improving student engagement*. Corwin Press.

Dean, C. B., Hubbell, E. R., Pitler, H., & Stone, B. J. (2012). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Ascd.

De Jong, R., Westerhof, K. J., & Creemers, B. P. (2000). Homework and student math achievement in junior high schools. *Educational Research and Evaluation*, *6*(2), 130-157.

Duffield, J., & Townsend, S. (1999). Developing teacher inquiry in partner schools through preservice teacher research. *Action in Teacher Education*, *21*(3), 13–20.

Duffy, M. & Heinz, M. (2019). Developing critical thinking, justification and generalisation skills in mathematics through Socratic questioning. *Journal of Teacher Action Research*. *5*(3).

Eberhardt, A., & Heinz, M. (2017). Walk little, look lots: Tuning into teachers' action research rhythm. *Studying Teacher Education*, *13*(1), 36-51.

Ellsasser, C. (2007). Do the math: Redesigning homework to create more time for learning. *Encounter*, 20, 20-24.

Epstein, J. L., & Van Voorhis, F. L. (2001). More than minutes: Teachers' roles in designing homework. *Educational psychologist*, *36*(3), 181-193.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of educational research*, *74*(1), 59-109.

Good, T., & Brophy, J. (2003). *Looking in classrooms* (9th Ed.). Boston, MA: Allyn et Bacon.

Hayes, C. (2015). *New Complete Geography.* Dublin: Gill Education.

Hattie, J. (1992). Measuring the effects of schooling. *Australian Journal of education*, *36*(1), 5-13.

Heinz, M. (2014). Initial Teacher Education in Ireland: Structure, policy developments and implications for practice. *Education's Role in Preparing Globally Competent Citizens*, 178-184.

Heinz, M., Davison, K., Ní Ghuidhir, S., Fleming, M., Kennedy, K. (2017). Integrating Practitioner Research in Initial Teacher Education in Ireland. *School of Education Research Seminar Seri*es, NUI Galway, 5 October.

Heinz, M., Keane, E. & Foley, C. (2017). Career motivations of student teachers in the Republic of Ireland: continuity and change during educational reform and 'Boom to Bust' economic times. In *Global perspectives on teacher motivation*. Cambridge University Press.

Keith, T. Z. (1982). Time spent on homework and high school grades: A large-sample path analysis. *Journal of educational psychology*, *74*(2), 248.

Kohn, A. (2006). *The homework myth: Why our kids get too much of a bad thing*. Cambridge, MA: Da Capo Press.

Kosnick, C. (2000). Looking back: Six teachers reflect on the action research experience in their teacher education programs. *Action in Teacher Education, 22(*2), 133–42.

Metallidou, P., & Vlachou, A. (2007). Motivational beliefs, cognitive engagement, and achievement in language and mathematics in elementary school children. *International Journal of Psychology*, *42*(1), 2-15.

Monroe, E. E., Gali, K., Swope, K., & Perreira, I. (2007). Preservice teachers' use of action research to implement alternatives to round robin reading. *Journal of Reading Education*, *32*(2), 13–17.

Moore, R. (1999). Preservice teachers engaged in reflective classroom research. *The Teacher Educator*, *34*(4), 259–275.

O' Mahoney, K. & Heinz, M. (2016). Using comment only marking in a mathematics classroom in the Republic of Ireland: experience and learning of a student teacher. *Journal of Teacher Action Research*, *2*(2), 58-69. Available at: http://www.practicalteacherresearch.com/uploads/5/6/2/4/56249715/mahoney1-12.pdf.

Ostorga, A., & Lopez, V. (2009). Impact of an action research instructional model: Student teachers as reflective thinkers. *Action in Teacher Education*, *30*(4), 18–27.

Paschal, R. A., Weinstein, T., & Walberg, H. J. W. (1984). The effects of homework on learning: A quantitative synthesis. *The Journal of Educational Research*, *78*(2), 97-104.

Rock, T. C., & Levin, B. B. (2002). Collaborative action research projects: Enhancing preservice teacher development in professional development schools. *Teacher Education Quarterly*, *29*(1), 7–21.

Sciarra, D., & Seirup, H. (2008). The multidimensionality of school engagement and math achievement among racial groups. *Professional School Counseling*, *11*(4), 218-228.

Trautwein, U. (2007). The homework–achievement relation reconsidered: Differentiating homework time, homework frequency, and homework effort. *Learning and Instruction*, *17*(3), 372-388.

Van Voorhis, F. L. (2003). Interactive homework in middle school: Effects on family involvement and science achievement. *The Journal of Educational Research*, *96*(6), 323-338.

Wormeli, R. (2006). *Fair isn't always equal: Assessing & grading in the differentiated classroom*. Stenhouse Publishers.

Appendix 1: Differentiated homework strategy

Students were required to choose 1 option from a possible 3 choices. The questions are ranked in relation to difficulty levels, as categorised by Bloom's Taxonomy Pyramid (Bloom and Krathwohl, 1956) and the Cognitive Processes and knowledge Dimensions (Anderson and Krathwol, 2001). For ease of understanding, the questions are marked H (hard), M (medium), and E (easy). The students are unaware of the difficulty levels and are free to choose whichever option they want.

Week 1 – Topic: Erosion, Deposition and Transportation.

Homework Options:

1. Select 1 Coastal Landform, and with the aid of a labelled diagram explain how it was formed. (H)
2. Explain 2 ways in which the sea either erodes or deposits along the coastline. (M)
3. List 3 processes by which the sea interacts with the coast and give an example of a landform created by each process. (E)

Week 2 – Topic: Humans and the Sea.

Homework Options:

1. Pick 1 coastal process, describe a problem it creates and outline how you would prevent it. (E)
2. Explain 2 ways in which humans can have a negative impact on the sea. (M)
3. People see the coastal areas differently according to their own needs. (H)
   i)   List 2 priorities that each of the following people would have in a small coastal town. A Trawler owner, A hotel owner, and an environmentalist.
   ii) Describe 2 issues that these individuals would disagree on.

Week 3 – Topic: Sea litter and Marine Trash

Homework Options:

1. Write an article for a local paper outlining a plan that could reduce the amount of litter in the oceans environment. (H)
2. Draft a letter that you would send to local businesses in the Galway area asking them to start using biodegradable materials. Let them know the effect plastic it is having on both the animal population and the environment. (M)
3. In the centre of your page brainstorm at least 5 ways in which you could contribute to a litter free marine environment. (E)

Week 4 – Topic: Introduction to the Glacial Landscape

Homework Options:

1. Define and locate at least 2 types of glaciers. (E)
2. Describe what a glacier is and where they are most commonly found. (M)
3. Explain what a glacier is and then outline how you think it might impact on the landscape in which it is located. (H)

Week 5 – Topic: Living in Glacial Environments

Homework Options:

1. Outline both the advantages and disadvantages you associate with living in a glacial environment. (M)
2. How have people adapted to living in glacial environments? (H)
3. Write a list of possible jobs for people in glacial regions that are not commonly found in other places. (E)

Week 6 – Topic: Glaciers

Homework Options:

1. Identify two ways in which glaciated landscaped are attractive for:
   i)   Tourism.
   ii) Agriculture. (E)
2. Differentiate between the 3 different types of moraines. (M)
3. Can you construct and label a diagram, from your own perspective, for either a boulder clay deposit, an erratic, or an outwash plain. (H)