Promoting Student Interest in Mathematics
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Introduction
In recent times there has been much focus regarding the low numbers studying Higher Level mathematics in Ireland. The Irish Government has responded through initiatives such as ‘Project Maths’ and the plan of awarding extra bonus points. However, while these initiatives may prove to be worthwhile, such efforts are futile unless students themselves have a desire and motivation to learn the subject. Hidi and Harackiewicz (2000) established that the key to influencing an individual’s academic performance lies in increasing the individual’s interest in the particular domain. As Csikszentmihalyi (1990:126) stated “if intrigued by the opportunities of the domain, most students will make sure to develop the skills they need to operate within it”. Thus, the long-term key to boosting the numbers taking Higher Level mathematics in Ireland must be to increase students’ interest in the subject.

Current research figures show that there is much work to do in this respect. Statistics released by PISA (2003) show that less than half (48 per cent) of Irish students agree that they are interested in the things they learn in mathematics. This figure was slightly down on the OECD average of 53 per cent. In addition only 32 per cent of Irish students declare that they look forward to their mathematics lessons, while only 33 per cent concur that they do mathematics for the enjoyment. The same study disclosed that over two-thirds of Irish 15 year olds ‘often feel bored’ at school, while the OECD average for this was under 50 per cent (OECD 2003). However, despite such alarming figures, little is known about how to develop interest and utilise it to enhance students’ learning. This article examines how best to trigger, and more importantly maintain, student interest in a topic.

What is Interest?
Can interest be defined as a temporary fixation, attraction or appeal? Is it just an inclination or an attitude? Boekaerts and Boscolo (2002) propose that interest is conceptualised as the effect that relates one’s self to the activities that provide the type of novelty, challenge, or aesthetic appeal that one desires. Hidi and Harackiewicz (2000) describe interest as an interactive relation between an individual and certain aspects of his or her environment (e.g. objects, events, ideas). It can be viewed both as a state and as an outlook of a person, and it has a cognitive as well as an affective component. Indeed, many researchers went as far as arguing that interest is a basic emotion (Silvia, 2001). Hidi (2006) considers interest to be a unique motivational variable, as well as a psychological condition that occurs during interactions between persons and their objects of interest, and is characterised by increased attention, concentration and affect.

Importance of Interest
Present-day research has demonstrated that interest has a powerful influence on academic performance (Hidi and Harackiewicz, 2000). Del Favero et al. (2007) determine that many studies have shown the energising function of interest in fostering, remembering and understanding material, and stimulating students’ positive attitude towards a topic (e.g. Hidi, 1990; Mason & Boscolo, 2004; Schiefele, 1991, 1998). This view is supported by Hidi and Anderson’s (1999) work who argue that interest has a profound effect on students’ recollection and retrieval processes, their acquisition of knowledge, and their effort expenditure. In addition, an interested individual is more likely to develop high competency and to receive positive feedback from others (Hidi et al., 2002). Being interested may also serve as protection
against the negative effects of failure (Hidi & Renninger, 2006). On top of this Alexander (1997) suggested that interest may be the key to early stages of learning, as well as to differences between expert and moderately skilled performers. When interested in a topic or domain, students are more likely to use higher-order learning, thus improving their knowledge.

Types of Interest
There are two main types of interest, namely, situational interest and individual interest.

- **Situational interest**
  Situational interest is environmentally triggered and involves an affective reaction and focused attention (Hidi, 2006). Boekaerts and Boscolo (2002) acknowledge that it is dependent on favourable environmental conditions, and can therefore be transient in nature. However, De Favero et al. (2007) note that it can influence learning by inducing stronger attention to learning materials and by increasing persistence in the task. Research suggests that situational interest should play an important role in learning, especially when students do not have pre-existing individual interests in academic activities, content areas, or topics (Hidi and Harackiewicz, 2000). Indeed, more specifically, the same authors suggest that the employment of situational interest could make a significant contribution to the motivation of academically unmotivated children.

- **Individual interest**
  This is often referred to as personal interest. Boekaerts and Boscolo (2002) define individual interest as interest built on stored knowledge about a class of objects or ideas, which leads to a desire to be involved in activities related to such. It is the interest that students bring to some environment or context. Those experiencing this type of interest possess an inner drive to seek out opportunities to learn more about a specific topic. Hidi and Harackiewicz (2000) ascertained that it is a relatively enduring predisposition that develops over time and is associated with increased knowledge, value, and positive feelings. The learners’ individual interests energise and motivate their thoughts and actions in a very goal-directed way (Alexander, 1997). An interested person can therefore formulate curiosity questions, and attenuate negative feelings, such as frustration and anxiety (Hidi & Renninger, 2006). Indeed, Hidi and Harackiewicz (2000) note that investigations focusing on individual interest have shown that those who are interested in particular activities or topics pay closer attention, persist for longer periods of time, learn more and enjoy their involvement to a greater degree than individuals without such interest.

Differences between individual and situational interest
Differences between individual and situational interest are noted throughout the literature. For example Hidi and Harackiewicz (2000) determine that while individual interest develops slowly and tends to be relatively long-lasting, situational interest is triggered more suddenly by environmental factors across individuals. Research carried out by Alexander (1997) shows that situational interest is expected to play a stronger role in the early periods of learning than individual interest. Something about the topic or the context grabs the student’s attention and urges them onward. However, as individuals progress toward competency in the target domain, individual interest becomes increasingly more important, with the effects of situational interest levelling off.

Nevertheless, while individual and situational interests are undoubtedly distinct, they are not completely dissimilar phenomenon. Studies carried out by researchers such as Hidi and Harackiewicz (2000) and Alexander (1997) provide evidence that both can interact and influence each other’s development. For example, individual interest in a particular topic may help students persevere through boring presentations or texts about that topic, and situational interest elicited by presentations or texts may maintain
motivation and performance, even when individuals have no personal interest in particular topics. In addition, situational interest can actually contribute to the development of long-lasting individual interests. For example, students who are exposed to an exciting lesson in statistics may be stimulated and pay more attention in class than they ever have before. For some students, this interest may evaporate as soon as the lesson ends. For others, the interest triggered in this situation may persist over time and may develop into individual interest in statistics.

How can I use this in the mathematics classroom?
Steen (1990) determined that mathematics can be made exciting for students if fresh perspectives on mathematical concepts are adopted and presented in schools. Teachers undoubtedly play a central role here. There are many recommendations offered throughout the literature. Firstly, it is important that teachers always demonstrate their own interest in the subject matter (Bergin, 1999). The next task for them is to engage their students in the topic. This can be done using certain aspects of the learning environment, such as modification of teaching materials and strategies, and how tasks are presented (Hidi and Harackiewicz, 2000). Hidi (2006) suggested other means to achieve interest such as selecting resources that trigger interest. These may include games, puzzles, and hands-on activities, depending on the particular topic. The textbook also has a major role to play as many lessons often revolve around the textbook. Thus it has the potential to play a major role in stimulating and promoting student interest in mathematics. According to Mikk (2000: 245) interest in textbooks can be increased with the inclusion of:
- Historical Data: references to discoveries and applications.
- Practical Applications: concrete examples as opposed to theoretical explanations.
- Inclusion of Problems: questions aimed at reproducing, analysing and applying information.
- Humour: proverbs, riddles, jokes, etc.
- Figurative Representations: illustrations and mental images.
- Narrations about People: real life facts interlinked with historical data.

Apart from content, many researchers highlight the need for relevant, bright, attractive illustrations in textbooks to trigger initial student interest (Mikk, 2000). These graphics not only assist with students understanding but also assist in grabbing and engaging a student’s attention (Mikk, 2000). However, while resources such as games, puzzles, hands-on activities and bright illustrated textbooks definitely trigger student interest, many of them fail to maintain the student’s interest over time (Mitchell, 1993). Thus the question remains, how can academically relevant interests be nurtured, utilised and indeed maintained.

A study carried out by Mitchell (1993) in the US found that the two main factors in maintaining student interest over time were the meaningfulness of the task and student involvement. Meaningfulness refers to students’ perception of topics as meaningful to their own lives. For example, presenting mathematics in more relevant contexts illustrates the value of the subject and makes it more personally relevant for the student. Meaningfulness appeared effective because content that is perceived as being personally meaningful to students is a direct way to empower students and hold their interest (Mitchell, 1993). Involvement refers to the degree to which students feel they are active participants in the learning process. In Mitchell’s study, involvement also appeared effective because when the process of learning is experienced as absorbing, then that process is perceived as empowering to students and will therefore hold their attention (Mitchell, 1993). Basically, students are more interested when they learn by doing as opposed to sitting and listening.
Similar to empowering students through meaningfulness and involvement, Hidi and Harackiewicz (2000) found that affording students more choice, or promoting perceived autonomy can also promote individual interest. Affording more choice may be a simple undertaking such as allowing students to choose what topic to progress onto next. Perceived autonomy could involve trusting that the students have their homework done without checking each individual. Del Favero et al. (2007) also suggested that several forms of social interaction may also support the development of interest at various stages. This view was supported by Hidi and Harackiewicz (2000) who found that working in the presence of others resulted in increased interest for some individuals. This supports the case for the inclusion of group work and discussion in the classroom. Furthermore Del Favero et al. (2007) determined that problem-solving often can maintain interest through encouraging further exploration of concepts and ideas. Hence there are many high-quality proposals on how to enhance both situational and individual interest in mathematics. Many of these are simple ideas which can easily be adapted in any classroom.

References


