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TO WHOM IT MAY CONCERN

Mathematics and Physical Sciences website materials sponsored by the Actuarial Society of South Africa

In South Africa, as in many other countries, there is great concern about the underachievement of especially Grade 12 Mathematics and Physical Sciences learners and, eventually and inevitably, the effect of this challenge on tertiary study on the national economy. Performing well in Mathematics and Physical Sciences at school and at tertiary level university holds the promise of survival not only for individual learners, but indeed for developing countries collectively. Far too many learners in Mathematics and Physical Sciences in particular still underachieve in Grade 12, something that has a far-reaching negative effect on their chances of gaining access to tertiary institutions and choosing a career, designing a successful life and making social contributions. This is unsurprising. Fundamental changes in the workplace across all countries in recent times call for a contemporary response from Mathematics and Physical Sciences teaching theorists and practitioners as well as researchers and learners. An approach to teaching in learning in Mathematics and Physical Sciences is needed that will enable Mathematics and Physical Sciences teachers to equip learners with the necessary skills to respond to these changes – a **positive** teaching and learning approach in Mathematics and Physical Sciences. In the final instance, Mathematics and Physical Sciences teachers and learners alike should exploit change to advance positive career counselling – the ultimate aim of theory and praxis in the field.

The following should be kept in mind when we reflect on teaching and learning in Mathematics and Physical Sciences:

- (i) To learn by oneself is meaningful. Often, when work makes sense for them, learners will tackle problems that they consider difficult, but they will ask for help when they need it.
- (ii) The ability to master Mathematics and Physical Sciences content is carried forward from one generation to the next. Learners acquire the syllabus with the help of their parents, siblings, books, the radio, television, and information communication technology-related facilities (such those that John Bransby and his colleagues have developed) and their cultural milieu.
- (iii) Learning is infinitely more than mere coaching. To the same extent that learners are dependent on their culture for information and counsel (for example, they can only learn to count once they have been taught the names of the figures), to the same extent it is true that they themselves will guide the process of learning. Thus, they decide what they are interested in, when they want to learn or practise something, and when they wish to ask for information.
- (iv) Problem-solving, problem-centred learning, (social) constructivism and learner involvement during which learners discover, construct or shape their own standard strategies to solve problems, are quite acceptable – as one approach, one way of discovering ‘truths’, in conjunction with other approaches.
- (v) Discovery or creation in Mathematics and Physical Sciences classrooms and at home and during less formal teaching and learning opportunities need and should not occur in a logical-deductive manner only – classroom discussions (also in a group context), own activity, (class) discussions and independent work can only contribute to the construction of new work.

It is evident from what has been said above that a meaningful combination of teaching and learning approaches, and opportunities in particular, shaped by our idiosyncratic circumstances, provide us with our best chance to achieve successful teaching and learning. This is exactly why I regard John and his colleagues’ ground-breaking efforts as so important.

Viewed from a different, yet related perspective, it should be said that much has been written about underachievement in Mathematics and Physical Sciences at secondary and tertiary level, and

many solutions have been proposed, yet little has been written on the role career counselling can play in helping solve the challenge. This important gap, too, is addressed by John and his colleagues by means of the resources being offered by their website, which should equip Mathematics and Physical Sciences teachers and facilitators with the skills to facilitate learners' reflection on their own reflections in Mathematics and Physical Sciences. Even though it cannot be expected of teachers in Mathematics and Physical Sciences to become 'experts' in counselling, they need to be equipped with at least some basic reflective and narrative counselling skills as well because teaching Mathematics and Physical Sciences is optimised when it addresses the cognitive, affective and conative sides of learners in an integrated manner. Learners in their totality (not only their brain) should be involved in teaching and learning. Teaching at all levels should be underpinned by the know-how to normalise learners' multiple experiences, to encourage them and to inspire them during the learning facilitation process. Collaboration between Mathematics and Physical Sciences and life orientation teachers is thus needed to ensure that important information about students is made available to all stakeholders so that they can help students not only achieve in Mathematics and Physical Sciences but, more importantly, listen to and advise themselves regarding the salient elements of choosing a career, designing a successful life and making social contributions.

John and his colleagues offer 15 000 pages on their website for free (everything is sponsored by the Actuarial Society of South Africa). This includes the following:

The use of laptops, tablets, learner notebooks, computers, tablets and smart phones, either in classrooms or at home; learners using worksheets from which to do classwork and homework; the use of hardware and materials at school and at home; Grade 11 and 12 afternoon and Saturday tutorials; autumn, winter and spring school programmes; and the use of the forum on the website. Invaluable information is provided on study skills for Mathematics and Physical Sciences; on Career Counselling, on past tests and examination papers, as well as on all South African universities.

The aim is to help many more learners achieve above 70% in Mathematics and Physical Sciences. Achievement of this aim will undoubtedly help them qualify for and successfully complete sought-after study courses at tertiary level. Moreover, and more importantly, this will go some way towards helping our country produce more actuaries, engineers, Mathematics and Physical Sciences teachers, doctors, accountants, as well as natural scientists and other professionals for the future. The resource potentially facilitates integrated intervention (integrated assessment and intervention) in Mathematics and Physical Sciences classrooms to make the teaching and learning in these classrooms truly dynamic.

In a nutshell: Free access is given to every learner, anywhere in the country to state-of-the-art materials that should help them to attain better marks in Mathematics and Physical Sciences. It thus seems that using John and his colleagues' most useful website can significantly improve learners' chances of not only achieving at tertiary level but, more importantly, also designing and living successful lives during which they can make important social contributions.

I therefore take great pleasure in endorsing this novel and innovative idea without reservation.

Yours sincerely

A handwritten signature in black ink, appearing to read 'J. G. Maree', with a stylized flourish at the end.

PROF. J. G. (KOBUS) MAREE