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SMEC 21

Conference Proceedings

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Department of Education
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SMEC 21 MISSION STATEMENT

The SMEC Conference is an annual event designed to promote the continued development of a professional community of mathematics and science educators across Lebanon and throughout the region. Specifically, the conference aims to:

- Provide an intellectual and professional forum for teachers to exchange theoretical and practical ideas regarding the teaching and learning of mathematics and science at the elementary, intermediate, and secondary levels

- Provide a forum for teacher educators and researchers to share their findings with science and mathematics teachers with a special emphasis on the practical classroom implications of their findings

- Provide an opportunity for science and mathematics teachers to interact with high-caliber science and mathematics education professionals from abroad

- Contribute to the ongoing development of a professional culture of science and mathematics teaching at the school level in Lebanon and in the region

- Raise awareness of science and mathematics teachers about the array of curriculum and supplemental classroom materials available to them through publishers and local distributors

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Plenary Session Science

Talking Science: Teaching and Learning Science in Multilingual Classrooms in South Africa

Audrey Msimanga, School of Education, Sol Plaatje University in Kimberley, South Africa

Research globally shows that for many English Additional Language Learners (EALs) language remains a critical factor in performance in science subjects and subsequent uptake of STEM careers. Some researchers argue that learning science is like learning a new language, the language of science. EALs learn this (new) language of science in a second or additional language, which in most cases they are not proficient in. Thus, for EALs learning science is not just a conceptual task but a linguistic one as well. While there has been extensive research to understand the challenges of EALs learning science, there is very little practice-based evidence on teaching and learning strategies that enable EALs to navigate both the conceptual and linguistic borders during science teaching and learning. Where it exists, the findings of such research have not found their way into teacher education programmes to help prepare teachers to teach science effectively in contexts of linguistic diversity. I will draw from emerging findings from the Language in Science Project (LiSP) that has been running in one of the provinces of South Africa since 2014 to explore whether and how research can empower teacher education to prepare science teachers to be able to mobilise the linguistic resources of their teaching and learning contexts to maximise student access to and success in science subjects.

Plenary Session Mathematics

Language diversity in mathematics classrooms - empirical findings and language-responsive teaching approaches

Susanne Prediger, Institute for Development and Research in Mathematics Education
TU Dortmund University

Achievement gaps between monolingual and multilingual students or between students of high and low socio-economic status can be explained by language gaps. That means, students with high academic language proficiency outperform their less proficient peers. Thus, for increasing equity, language diversity of math and science classrooms should be taken into account. The talk presents empirical findings for explaining the language gap and language-responsive teaching approaches which
have been shown to be effective for fostering language learners' mathematics learning.

Research Session

Analyzing plans of Localizing Professional Development of the Ministry of Education in Kuwait based on TPACK Model
Subtitle: Analysis of all subject plans with a focus study on actual training for both elementary and middle school levels

Dr. Fatimah M Al Hashem, GUST University, Kuwait

In current thinking the professional development of teachers is viewed as a continuum process that needs to contain content, pedagogical and technological knowledge. As The State of Kuwait Shifted the national curriculum to be based on competency based curriculum, top to down training system was designed by the supervisors and the World Bank as induction training program to support and aid teachers to adopt to the new curriculum. Descriptive analysis as well as qualitative approach were used to analyze the process of localizing training in public schools of Kuwait based on TPACK model. This research, with its analyses and recommendations, will be the first step towards the provision of a roadmap for the career-long professional development of teachers in Kuwait and a basis for the formulation of policies on which a *Teacher Education Strategy* and a *National Teacher Framework* can be built.

Introduction

Teachers share a significant responsibility in preparing young people to lead successful and productive lives. There is a broad consensus that teacher quality is the single most important in-school factor influencing student achievement[1]. Sustained professional development for teachers is associated with more positive and stimulating teacher behavior and positive student outcomes. When designed well, these opportunities help teachers master content, improve teaching skills, and address challenges faced in the classroom. However, the professional development in Kuwait still in need of development to fulfill the teachers' requirement. Technical Supervisors in Kuwait have the formal responsibility for the provision of professional development for teachers. There are 18 General Supervisors each of whom is responsible for one of the 18 subjects. While shifting the national curriculum of Kuwait to competency based curriculum starting in year 2016 (Kuwait review of Professional Development, 2016), the education field needed incentive amount of induction and training for teachers to adopt to the new curriculum. The training is delivered either through one-week courses in one of the training centers or through one-off

[1] Organization for Economic Co-Operation and Development (OECD), Teachers matter: Attracting, Developing and retaining effective teachers, Paris, OECD Publishing, 2005.

workshops in district centers or in schools. This training is largely subject or pedagogical-related. It is determined in a top-down manner by the *Supervisors* with little or no consultation with teachers as to their need (Kuwait review of Professional Development, 2016). Also, The lack of adequate of training programs, and the continuous follow-up in terms of professional development. The evidence from a broad range of interviewees strongly suggested that the mode of training delivery was formal, lecture-oriented, and did not normally entail much hands-on involvement of the participating teachers. Thus, in this research, the plans of localizing training provided by the public education sector was examined to answer the following:

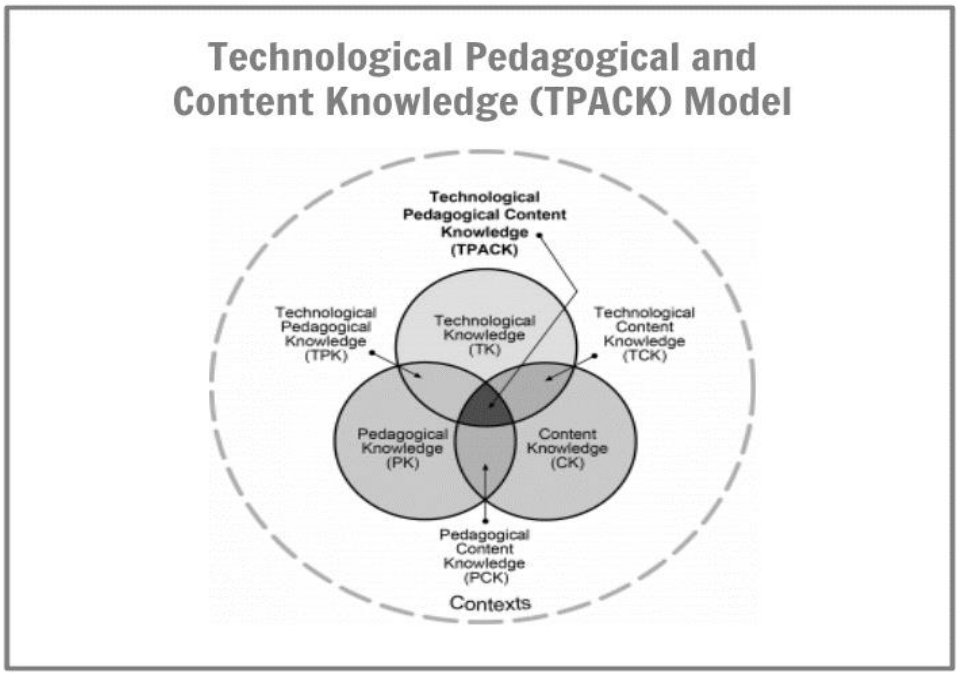
- What is the number of training courses prepared by each supervisory for each subject?
- What are the elements included in the training based on TPACK? (Educational / technological / specialized / administrative / administrative)
- What is the duration of the localization plan? Who is involved in training? What are the stages covered by the training resettlement plan? And why the fixed schedule of the plan to localize training?
- What was included in the training material for the training resettlement plan?

The Training Models:

TPACK Model

The professional development that was conducted during the years 2016 – 2017 was explored based on number of trainings in terms of pedagogical, content, and technological knowledge among teachers in both elementary and middle school level. The design was based on TPACK model. The acronym TPACK refers to "Technology Pedagogy and Content Knowledge," and these three elements (technology, pedagogy, and content) are presumed to be familiar to teachers and to be continually applied in their classrooms. Not only are teachers required to understand relevant content knowledge, they also need to know how to convey this content to their students; at the same time, they need to adapt and update their technological knowledge to keep up with technical and lifestyle developments.

Thomas, Herring, Redmond, & Smaldino, (2013) stated that educational leaders must establish a clear vision for how their programs will develop candidates who are TPACK competent and who can become models/change agents at their schools. Technology, pedagogy, and content knowledge (TPACK) model is extensively used to scaffold teacher's integration knowledge and skills into their practices. Thus, it is essential that teachers understand the concept of TPACK, which will help them connect their skills with content via technological means to produce integrated lesson plans. More broadly, it is very important that teachers know how to wisely and purposefully add technology into their practice and to use different methods to deliver content.



Method:

Statistical Methodology:

Descriptive analysis of the number and quality of training programs in each supervisory were counted and categorized using TPACK model as a guide. The analyses took into consideration the fact that there were some training courses related to school administration.

Qualitative Approach:

In order to have a complete image of the whole situation about the training. In depth analytical reading to the training program, focus groups, visits for training sessions and interviews were conducted to know the sources, backgrounds and rationales behind each training course.

Results: Include the results of the study

The descriptive analysis results:

The focus of the training was more on the educational aspect, especially on the issue of strengthening the educational aspect is important and its presence was noted in all plans.

There was a marked discrepancy between the number of training sessions on the material level and this is due to the nature of each subject. But there was a difference in the level of one article (physical education of girls / boys) which may raise a big question: “what are the bases of building the training model?”. The training programs were not described except for the science. The science supervisory described the preparations for the training programs and the development of general guidelines only. Most of the training were missing the technology side. It was also noted that there was no clear methodology for laying the groundwork for training.

The qualitative results

In terms of school visits: we have attended a sixth grade lesson in based on the competency curriculum. Then, it was followed by a meeting to discuss applications, compare it with other regions, and the extent of application for other school districts. After that, it was followed by a training session. Discussion was held between the supervisors of the various educational districts about the pros and cons in the lesson. We have been provided with visual presentations on the plan for localization of training, which includes an explanation of the lessons and applications according to the competency curriculum.

Discussion and Implications for Practice:

The focus on the educational aspect, especially on the issue of strengthening the educational aspect is important and its presence was noted in all plans for the resettlement of training and this is positive. There was a marked discrepancy between the number of training sessions on the material level.

It is fine to set up the plan to localize the training and enrich the educational field with new curriculum techniques and provide them with ongoing training, however, the critical part remains in being innovative and provide the teacher with their needs rather than top down- or uncategorized type of training. It was noticeable from the results that there were no clear vision on how to determine the training for teachers. This is normal if there is a radical change in the national curriculum, but in the near future, and with the application of self-evaluation of the teacher, the training programs should be a combination of a vision for development by guidance and an actual need of teachers through surveying or any other methods. Training requires high competencies in the transfer of experience and a thorough understanding of the training material. The training of heads of departments for a week to transfer knowledge, is not enough, and affected negatively in the transferring the actual material, and thus affect the teacher's understanding of the curriculum competencies.

Recommendations:

On Planning for Training Localization:

- Prepare training plans based on two things (vision guidance and teacher needs).
- The development of exercises that integrate the actual needs in the field and the latest educational innovations that the ministry seeks to continue.
- Increase the integration of teachers with outstanding experience in planning and implementing training programs in accordance with the frameworks and controls.
- Establish clear criteria for training to be in equal proportions.
- Activate the teacher self-assessment, adapt the needs of the teachers and plan the localization of training.
- Blogging, documentation and compliance are among the most important factors that will help the field improve training and develop it.

On the training material and methods:

- Develop specific frameworks to help guide the development of training without neglecting one aspect (educational / specialized / administrative / technological).

- To find the balance between the three training components of the educational, cognitive and technological head, while not neglecting any of the other components needed by the field (administrative)
- Increase technology topics and employ them in the competency curriculum.
- For active learning, training must be active, and it should increase the number of workshops and practices and reduce the lecture style.
- Use of the centers available to develop and support the guidance towards upgrading the training as well as the head of the department.
- Archive of plans and educational programs and the use of the curriculum sector on the work of publications in the training programs or lessons annotated and uploaded electronically on the website of the Ministry of Education.
- Link professional development and training as an integral part of supervisory functions.

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Effect of ICT on Elementary Students' Reasoning & Communication Skills in Science at Lebanese Private Schools

Layal Omar Temsah, Supervised by: Dr.Nehme Safa, Saint Joseph University, Lebanon

With the outbreak of the new technology era and the emergence of multiple technological tools such as active boards, mobile devices and tabs for teaching science, the effectiveness and appropriateness of these tools are yet questionable. Students' performance in science, especially in the Arab world, is still unsatisfactory as shown by the TIMMS results of 2007 and 2011. In Lebanon, it was interesting to understand what was being done in schools to improve students' outcomes prior to sitting for international exams, specifically at the elementary level. The

purpose of this study was to explore the perceptions of Heads of private elementary schools and science coordinators and teachers, regarding the use of technology, and the extent to which these technologies were enhancing students' reasoning and communication skills. Participants in this study were 164 grade- six students from three private schools in different regions of the Lebanese capital. They also included three Heads of Elementary schools and four science teachers of whom three were also coordinators**.** Semi-structured interviews and class observations were used. Findings revealed that the vision and mission of the school leadership, and the teachers' practices associated with the appropriate integration of technology were key determinants for enhancing students' reasoning and communication skills in science.

Introduction

With the outbreak of the technological revolution and the emergence of many trends and issues related to education and the twenty-first century skills, a need for addressing students' overall academic achievement and their cognitive development in response to advancements in science and technology is inevitable. Modern science learning calls for the active-engagement of students in hands-on activities and inquiry processes in order to construct their knowledge and effectively communicate their understanding (Rappolt-Schlichtmann, Daley, Lim, Lapinski, Robinson, Johnson, 2013; Cakir, 2011; Kim,Van Tassel-Baska, Bracken, Feng, Stambaugh, 2014). Such active learning calls for enhanced critical thinking skills which are congruent with the 21st century educational frameworks. The enhancement of these skills in science needs to cater for the subject-matter relevant barriers such as challenges in reading and writing, hindered reasoning and communication skills, and low motivation for learning science (Rappolt-Schlichtmann et al., 2013; Kim et al., 2014).

A study called TIMSS (Trends in International Mathematics and Science Study, 2011) was conducted by the International Association for the Evaluation of Educational Achievement (IEA) to measure students' achievement in Science and Mathematics. It showed that the cognitive domains that were assessed were knowledge, application, and reasoning. Lebanon's rank was 39 in the world among 63 countries, and the tenth in the Arab countries (NCERD, 1999; OECD, 2009; OECD, 2013). TIMSS comparative study between 2007 and 2011 revealed a significant decline in students' performance on the reasoning, application, and knowledge domains in Lebanon among other Arab Countries.

According to research, "reasoning is the logic for why the evidence supports the claim, which can often include scientific principles", (McNeill, Lizotte, Krajcik & Marx, 2006, p. 156). According to the Organization for Economic Co-operation and Development (OECD) and other researches, reasoning was strongly associated with oral and written communication in addition to argumentative discourse (Hardy et.al, 2010; McNeill et.al, 2006). In Lebanon, the National Center for Educational Research and Development (NCERD, 1999) defined scientific communication as composing a text or doing a display of the results. It involved using a suitable language in scientific writing in addition to tracing curves, and constructing tables (McNeill, Lizotte, Krajcik & Marx, 2006; NCERD, 1999).

Theoretical Framework

Science learning using technology could be viewed as a process where there is a need to interrelate critical thinking and students' knowledge. In this regard, Bloom's higher order thinking skills require teachers to use instructional strategies that reduce memory-overload and stimulate the working-memory. In his definition of critical thinking, Hughes included the improvement of memory, reasoning, analysis, hypothesis testing, decision-making and problem solving (Bou Jaoude, 2018; Hughes, 2014; Krathwohl, 2002). According to Vygotsky (1930), to help a child acquire knowledge, adults need to determine the child's problem-solving ability as he/she works alone, and to discover what the same child could do with adult guidance. The difference between the latter two functioning levels was defined as the zone of proximal development (ZPD) (Altuna & Lareki, 2015; Olson, Greenfield, Gardner, and Cole, 2017). Jerome Bruner's (1966) research corroborated with that of Vygotsky's regarding the nurturing role of the environment where culture was considered to be the great molder of the thinking process and language was considered the key to cognitive development. In our study, the culture would be that of ongoing learning using technology, through the lens of social constructivism. In a study on the situated learning theory, Hwang et.al, 2011, found out that placing students in realistic learning environments through the integration of technology would improve their learning gains and enhancement of skills (Cakir ,2011; Wen et.al, 2012; Magnifico, Olmanson, and Cope, 2013; Chen et.al., 2015). However, other studies revealed demotivating factors which included second-language learners' understanding of technical and scientific terms, and the cost of technology means as highlighted by students (Chang & Kim, 2009; Efe, 2015).

Research Questions:

In this study, we addressed two of the above-mentioned cognitive domains, namely reasoning and communication at the elementary school level, thus preceding grade eight, to investigate the reasons behind students' weaknesses. We focused specifically on finding answers to two main questions:

1- What are Head of schools' and science coordinators'/teachers' perceptions about the benefits of technology use in enhancing reasoning and communication skills in grade-six science classes?

Methods

This study followed the case study qualitative design to observe the integration of technology in teaching science, and understand participants' perceptions regarding the enhancement of students' skills from the use of technology in science.

Population and Sample

Three private schools were purposively selected from Beirut and the Metn region, two K-12 schools and one K-6 with advanced technology infrastructure. The sample consisted of three Heads of Elementary Schools, 164 grade-six students, four teachers of whom three were the science coordinators and were teaching all grade six sections. The three schools were characterized by teaching science using the English language.

Instruments

Two instruments were developed based on several research studies. These instruments included an observation tool with open-ended remarks to observe students' learning with the use of technology, and semi-directed interviews with the Heads, coordinators, and teachers (Wu et.al, 2016; Creswell, 2014; OECD, 2013; Gay, Mills, & Airsian, 2012; Tarng et.al, 2012; Moukarzel, 2011; Lawson, 2000; NCERD, 1999). The semi-structured interview with the Heads of private elementary schools had six questions targeting three themes: the school mission and vision, the instructional strategies associated with the integration of technology, and perceptions about students' learning with technology.

Findings

Our findings encompassed results from Heads' and coordinators/teachers' interviews, and students' questionnaires.

Findings from Interviews

All three school Heads had a positive attitude toward the use of technology at the elementary level. In school A, the Head, coordinator, and teacher confirmed the beneficial outcome of using technology on students' learning. When asked about their role in guiding students toward the school's mission and vision, the Head referred to integrating 21st century skills, pointing out the benefits of technology with some controversy as to which tools target enhanced learning. The science teacher added the dimension of active learning strategies using prompts to generate students' solutions while working in groups. On the other hand, in school B, answers given by the Head and the science coordinator during interviews were not always congruent. Although they both agreed about the beneficial use of technology and yet none of this integration was mentioned in their depiction of the school's mission and vision. Nevertheless, when asked about instructional strategies and technological means, the Head emphasized the usage of the active board, flipped learning and developing critical thinking involving formulating questions. The science coordinator confirmed that the use of videos and the active board were efficient tools but she did not mention any of the strategies and practices implemented. The coordinator also reflected that she preferred to have hands-on experiments because "touching things makes you remember what you did". As for School C, when asked about their role in guiding teachers toward the vision and mission, the Head mentioned that they were developing "global citizens of the world capable of facing future challenges". It was obvious in the interviews, that among the three schools in the study, school C had the highest frequency and tendency of integrating technology. Moreover, regarding the instructional strategies associated with technology, the Head and the coordinator stressed that they were adapting online resources to the lessons taught. In conclusion, answers emerging from schools A and C interviews reflected a high coherence and consistency of purposes and goals among the school Heads, coordinators and teachers. While school B was found to have less coherence and common purpose in guiding the teaching and learning process regarding technology integration.

Findings from Classroom Observations

Seven observations were done in total in grade-six sections in the three schools: three observations in school A, three in school B, and one in school C. The classroom observation grids were mostly based on Bloom's taxonomy for reasoning, at the levels of knowledge, comprehension, application, analysis, synthesis, and evaluation. For communication, our observations focused more on the oral than the written skills.

In school A, the science coordinator who was also the teacher integrated technology in association with critical-thinking questions and used active learning strategies such as posing problems and eliciting students' responses through worksheets and charts. The students in her classes worked in groups and demonstrated reasoning skills at the level of picking up information and identifying variables. In school B, the science coordinator equally integrated the active white board in association with worksheets that triggered students' higher-order thinking skills in addition to questions at the levels of memory and understanding. However, students were working individually. The observed classes had different levels of interaction with the same teacher due to varied English language proficiency. School C, in turn, had only one grade-six section with the science coordinator as their teacher. The observed coordinator used technological/simulation tools such as augmented reality applications and VR tools, in addition to the interactive white board. However, she did not integrate active learning strategies such as group work or think/pair/share, nor did she bring students to think critically.

Regarding the observed communication skills, School A, had the highest level of "group communication skills". However, it had lower instances of "explaining concepts orally using clear scientific terms" and "explaining thoughts frequently and coherently": 10 students per session and per class. While, classes in school B had a higher number of students performing the latter two skills: 14 students per session and per class. On the other hand, though, we observed a high level of technology use in School C class, surprisingly, students showed the lowest levels of oral communication skills since they had only 7 students participating in class. As for the written communication skills, in school A, almost all students were on task during the group work. In school B, since they were handed individual worksheets, almost all students were writing their responses and we could listen to their written solutions, which means that the items "writing a meaningful text" and "drawing a table or graph" were attended to. However, the written communication skills could not be observed in school C, because the teacher did not require the students to write for any task.

Discussion

Findings from the interviews with the science coordinators, teachers and Heads of the three schools showed that the interviewees considered technology to be beneficial but to varied extents. In school A, the Head of elementary school, coordinator, and grade-six-teacher had a shared vision of a culture of technology literacy associated with critical thinking skills. The latter finding corroborated with a study by Tay et.al, in 2015 which mentioned that teachers' beliefs and practices were crucial for the successful integration of technology in addition to the school policy and leadership, technological infrastructure, and curriculum and assessment (Sparapani &

Calahan, 2014; Tay et.al, 2015). On the other hand, School C had the highest consistency in opinion regarding the integration of 21st century skills and critical thinking using technological aides. However, the class observations showed that critical thinking skills were not attended to, since teachers did not bring their students to analyze scientific problems, evaluate or critic results. As for school B, a discrepancy was evident between the science coordinator's thinking regarding technology integration and the higher emphasis on this regard expressed by the Head of the elementary school. In schools A, B, and C, the observed reasoning skills were higher at the lower levels of Bloom's Taxonomy such as to "pick up information", "compare/contrast" and "ask questions". The "analysis" part could not be observed and thus remained under question. Nevertheless, in school A, both the teacher and coordinator's interviews and observations revealed that they were using critical thinking questions, worksheets, and prompts in association with the technological means. School B observations and interviews also showed that they integrated higher-order thinking skills although the use of technology was less frequent than in schools A and C. Thus, our findings indicated that technology is only a means to raise higher order reasoning skills if associated with appropriate teaching practices. Based on observations, students in school C had low reasoning which was not the case for schools A and B which were using effective instructional strategies to enhance critical thinking. Communication in school A was found to be enhanced by combining active learning strategies mainly group work with the used interactive white board. The latter was confirmed by students' oral presentations of their written work and their active interaction during group work. As for school B, students were held personally accountable for responding to written tasks, since they were not involved in group work. While they had to respond separately to the teacher's oral questions, findings from observation grids showed that they had good oral and written communication skills which was also confirmed by the interviews with the school Head and the science coordinator. Interestingly, the analysis of school C results showed that students had the highest frequency of technology usage. However, it was observed that they were poor on oral and written communication skills despite the high participation levels they showed as triggered by technology use. Consequently, the extensive use of technology without engaging students in active learning and group work diminished their communication skills.

Implications and Recommendations

Future research about the effective use of technology to enhance students' higher-order thinking skills needs to be done combined with appropriate teaching strategies. These will open doors for teachers' professional development at all three levels: technology, teaching strategies to enhance higher order thinking skills, and student motivation for better achievement.

Influence of an Academic Intervention about Literal Symbols on Students' Performance (at Seventh and Eighth Grade Levels).

Manal Kiwan, Lebanese University, Lebanon

Several researches documented students' limited ability when dealing with tasks involving literal symbols (Koedinger& Nathan, 2004; Kiwan, 2015; Lochhead & Jos´e, 1999; Moses & Cobb, 2001; Usiskin, 1988;). This study investigates whether an academic intervention that explicitly highlights the different uses of literal symbols found at seventh grade level helps students perform better in tasks involving literal symbols. Moreover, it checks whether the intervention influences students' adoptation of the new uses of literal symbols introduced at eighth grdae level. For this purpose, a control group and an experimental group of seventh grade students were subject to the intervention that highlights the uses of literal symbols as *units, labels, constants, specific unknowns, continuous unknowns, generalized numbers* and *abstract symbols*. By the end of which, an assimilation test has been performed. Later on, by the end of grade eight, these students were subject to an accomodation test to check their adoptation of new roles of literal symbols introduced (*discrete unknowns* and *varying quantities).* This has been applied twice for the two consecutive academic years 2016-2017 and 2017-2018. Results revealed that students subject to the intervention showed a better performance in tasks involving the different uses literal symbols encountered in the intervention and even a better adoptation the new uses of literal symbols introduced at grade eight.

Goals and Objectives:
This study aims to:

- Specify whether an academic intervention that addresses the different uses of literal symbols helps improve students' performance in tasks involving literal symbols at grade seven.
- Check whether students subject to the academic intervention are more likely to adopt the new uses of literal symbols introduced at eigth grade levels.

Materials used during session: A projector.
Outline of the presentation:

- Highlight students' difficulties related to literal symbols (2 minutes)
- Specify the different uses of literal symbols found at seventh and eigth grade levels (2 minutes)
- Providing details about the academic intervention: design, sample and application (5 minutes)
- Stating the results (5 minutes).

Introduction

In school algebra, the use of literal symbols is superior over plain language because they serve the main focus of school algebra which is finding general methods and rules and using algebraic symbols and language to express the rules in a general form (Booth, 1988). But several researches revealed that using literal symbols seems a major obstacle for students (Koedinger& Nathan, 2004; Kiwan, 2015; Lochhead & Jos´e, 1999; Moses & Cobb, 2001; Usiskin, 1988;). Thus, massive effort should be implemented to prevent students' difficulties by committing to strategies that help in preventing the development of misconceptions and vague views of literal symbols at first place. Therefore, it might be beneficial to design a teaching plan that aims to

prevent the development of misconceptions related to literal symbols by helping students gain a better understanding and more awareness of the different uses of letters in algebra.

For the purpose of this study, Kiwan's (2015) categorization of uses of quantitative literal symbols is applied in addition to the role of literal symbols as a unit.

Role	Definition	Example
Label	Shorthand for a quantitative object (mostly in real life situations).	*A* in "*Let A be the area of triangle* ABC."
Constant	Stands for a quantity with fixed value in a specific context	π, a=3
Specific unknown	Stands for a unique unknown number that should be found.	*X* in *"Solve* $X + 5 = 8$*"*
Continuous unknowns	Stand for unknown values to be found yielding to interval solutions in $\mathbb{R}$.	*x* in "*Bound x knowing that* $1 < 2x - 4 < 7$*"*
Discrete unknown	Stand for unknown values to be found yielding to at least two solutions, yet the solution set is not an interval in $\mathbb{R}$.	*x* in "*Given that* $x^2 - 3x - 28 = 0$*,find the value of x."*
Generalized numbers	Present patterns of numbers that give true statements	a and b in "$a + b = b + a$"
Varying quantities	Present functional relationships between quantities.	x and y in "*equation of line (d):* $y = 9x - 2$"
Parameter	A quantity that influences the output or behavior of a mathematical object but is viewed as being held constant.	a and b in "*equation of line (d):* $y = ax + b$*"*
Abstract symbol	Literal symbols without number referent.	*x* in "*Simplify* $\frac{x^2-1}{x-1}$ *"*

Method

An academic intervention that highlights the different uses of literal symbols has been done at grade seven for the academic years 2016-2017 and 2017-2018 in a public school in Chouf region. In this plan, seventh grade students (who summed up to 82 students) were divided into two groups: a control group whose members attend the regular math class and experimental group whose members, in addition to attending math classes normally, are subject to the academic intervention.

Moreover, in order to check whether the applied intervention helps students adopt the new uses of literal symbols that are introduced at eighth grade level, an accommodation test has been applied at eighth grade level.

Design

Eight sessions (45 minutes each) have been designed in which the different roles of literal symbols that constitute the majority of letters in algebra at sixth grade (*units, labels, constants, specific and continuous unknowns, generalized numbers* and *abstract symbols*) and ways to deal with tasks involving each role are highlighted. The principal theoretical reference for the methodology of the intervention is Brousseau's Theory of Didactical Situations (TDS) that adopts the perspective that one of the main roles of the teacher is to construct a learning environment in a way that promotes students to adopt themselves to their 'milieu'(set of objects: physical, social or human with which the subject interacts) so that learning the required knowledge occurs. By the end of the intevention, an assimilation test whose tasks involve the different uses of literal symbols in the intervention has been give to both students of the control group and the experimental group to check any change in performance.

Moreover, in the academic year that follows their being subject to the intervention, students who pass seventh grade are subject to an accommodation test by the end of the eighth grade level to determine the control and experimental groups' abilities to adopt the new uses of literal symbols that are introduced at grade eight. These uses are *discrete unknowns* and *varying quantities*.

The percentage of correct answers obtained on the assimilation test and the accomdation test has been compared for both the control and experimental groups.

Results

Results of the assimilation test revealed that students subject to the intervention are more enabled to deal with tasks involving the different uses of literal symbols highligted in the intervention as shown in the figures below:

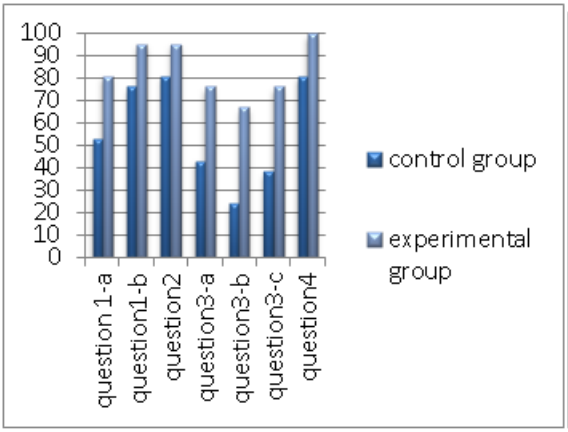

Figure 1: percentage of correct answers on assimilation test for the year 2016-2017

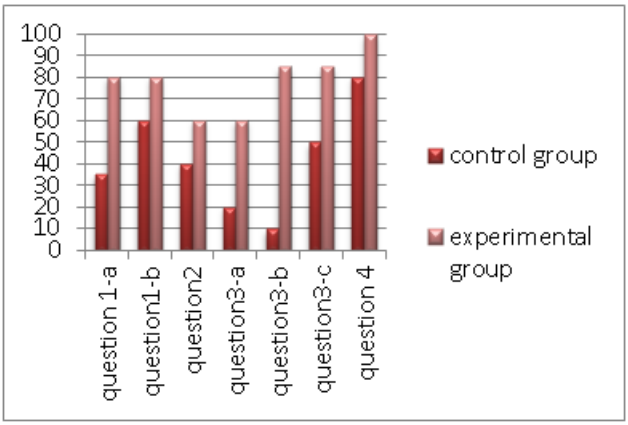

Figure 2: percentage of correct answers on assimilation test for the year 2017-2018

Moreover**, s**tudents who took the intervention in the academic year 2016-2017 showed a better ability than those of the control group in that year to adopt the new uses of literal symbols introduced at grade eight as shown in the figure below:

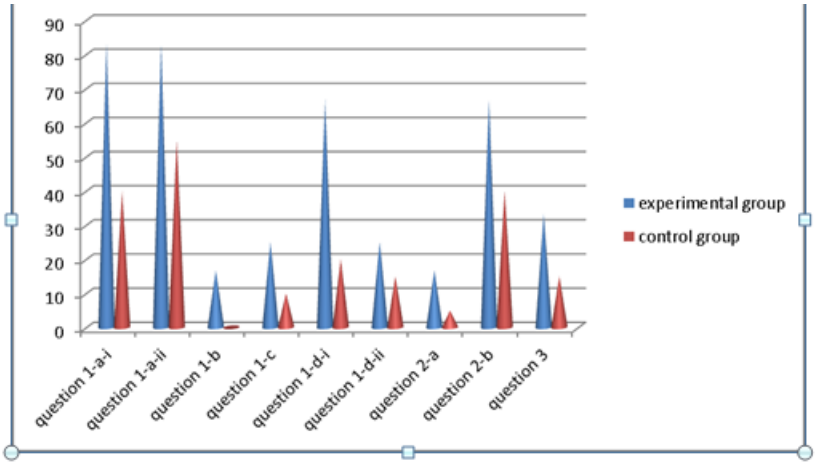

Figure .3: percentage of correct answers obtained on accomodation test for the academic year 2017-2018

Whereas students subject to the intervention in the academic year 2017-2018 are to be given the accommodation test by the end of the academic year 2018-2019.

Discussions and implications for practise

The academic intervention resulted in better students' performance in all of the different uses of literal symbols involved and even a better adaptation of the new roles introduced at the next grade level (grade eight). Yet, some students still have a hard time when dealing with tasks involving literal symbols as, even with the intervention, some wrong answers are still obtained in both the assimilation and accommodation tests. Thus, literal symbols can become more comprehensible for students when approached in new ways in math classes. Further studies on new ways to approach literal symbols might even result in better students' performance at seventh at eighth grade levels.

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مقارنة تعليم العلوم و الرياضيات باللغة الأجنبية في الحلقة الثانية من التعليم الأساسي مع تعليمه باللغة العربية : تجربة ثانوية الكوثر

فاطمة قبيسي، أماني الحاج، ثانوية الكوثر، لبنان

لا يزال تعليم الرياضيات و العلوم باللغة الأجنبية مقارنة باللغة الأم يأخذ الكثير من الجدل حول الأثر على تحصيل التلميذ من جهة وعلى ربط ما يتعلمه بواقعه و بالتالي توظيفه في حياته اليومية. تكمن أهمية هذا البحث في أنه يتضمن مقارنة تحصيل التلامذة في الرياضيات و العلوم و القدرة على الربط بالحياة اليومية لتلامذة يدرسون في نفس المدرسة, نفس المنهج, و حتى أحيانا نفس المدرس إنما ما يختلف فقط هو أن بعضهم يدرسها باللغة الأجنبية و بعضهم باللغة العربية. و عليه فإن الدراسة ستحاول الإجابة عن الأسئلة التالية: هل تعليم الرياضيات و العلوم باللغة الأجنبية أثر سلبا على تحصيل التلامذة؟ هل أثر على قدرتهم على توظيف ما تعلموه في حياتهم اليومية؟ هل تمكن التلميذ من اللغة الأجنبية أو العربية مرتبط بالتحصيل في المواد العلمية؟ هل الخلفية الثقافية و الإجتماعية و الإقتصادية للأهل مؤثرة في أفضلية التلعيم باللغة الأم مقارنة باللغة الأجنبية؟ سيتم إستخدام نتائج تلاميذ شعب الإنكليزي وشعب الفرنسي على مدار 3 سنوات متتالية وتحليلها ورصد نسب النجاح فيها والمعدلات الوسطية والمقارنة بينها بإستخدام تمثيلات بيانية بالخطوط و المقارنة مع التحصيل باللغات الأجنبية و دراسة متغير الخلفية الإقتصادية و الثقافية للأهل . وخلال العرض التفاعلي للمشاركين سيتم شرح جميع مراحل البحث وأدواته .

Developmental Workshops

Integrating Scratch software in triangles in Cycle 2 Math classes

Bassam El Hajj & Iman Osta, Lebanese American University, Lebanon

This workshop is intended for cycle 2 Mathematics teachers in Lebanon who seek to deepen their exploration in integrating digital technological resources in their classrooms.

In this workshop, we will approach and discuss the development of problem solving in the Mathematics teaching and learning processes, through Scratch Software.

The workshop is intended to introduce participants to Scratch features and tools in addition to the basic functionalities. To do this, we select situations in the context of Geometry that allow us to explore some of the potentialities of this multiplatform software.

In this workshop, the participants will have the opportunity to explore some of the activities as a means to discuss the potential impacts of the underlying geometric content in the context of the students' classroom experiences.

We intend to show and explore some projects developed that articulate computational thinking and Mathematical education in teaching and learning situations in the unit of types of triangles and their angles.

In this workshop, participants follow hands-on activities where they acquire the basics of computer programming and develop a small-scale software application using Scratch. This

workshop presents how learners assimilate and use these practices when developing their first computing application in a non-traditional learning experience.

Introduction

Scratch is an open-source programming environment. It is used to create games, animations and interactive stories. The current workshop is a part of a wider research that examines the effectiveness of using Scratch software as a tool to improve students' learning of geometry. The research showed that students who were experienced the Scratch-based activities appeared to exhibit more progress on knowledge, conceptual understanding, cognitive skills, and problem solving than students who were exposed to the usual methods of teaching. It seems to be reasonable and useful to recommend the use of coding and block-building software in teaching and learning mathematics.

Strategy

In this one-day introductory workshop, participants will learn to build scripts with Scratch, a visual block-based programming language developed by MIT. The target audience for this workshop are Math teachers for cycle two according to the Lebanese curriculum.

The objectives of this workshop are to:

- explore the use of Scratch software for providing better learning opportunities for teachers and students in geometry,
- and demonstrate the available blocks to construct different types of triangles.

Participants will be introduced to the software and will be involved in a hands-on experience session with computers to implement some of the scripts to construct triangles and explore their angles dynamically. Discussion sessions involving questioning and answering on the use of the software by teachers and students will be conducted.

At the end of the workshop, participants will be able to plan activities and instruction which harness the power of Scratch software, as an effective tool, in Math classes.

Description of Session

In this 120-minute introductory workshop, participants will learn to build scripts with Scratch, a visual block-based programming language designed to facilitate media manipulation. They will code instructions that align with the Lebanese curriculum related to geometric problem solving. The workshop will use visual presentations, written handouts, interactive tasks, and group work. The workshop will take place in a computer lab. With the use of Scratch, the workshop will provide great opportunities for participants to:

- discuss a problem using visuals,
- examine a ready-made program,
- explore how the angles differ dynamically using the variable readouts,
- describe figures that represent right angles,
- use Motion, Hide, and Control Blocks,
- assemble codes to represent a right-angled triangle,

- differentiate interior and exterior angles,
- and construct scalene, isosceles, and equilateral triangles.

Conclusion

The workshop will show that students who will be experienced the Scratch-based activities will appear to exhibit more progress than students who will be exposed to the usual methods of teaching. It is reasonable and useful to recommend the use of coding and block-building software in teaching and learning mathematics, especially for improving conceptual understanding and problem solving.

Conceptual Mathematics Test Items

Houssam Kasti, American University of Beirut, Lebanon

The United States National Council of the Teachers of Mathematics NCTM (Collins, 2011) defines four levels of cognitive assessment questions: memorization (knowledge), procedures without connections (procedural), procedures with connections (conceptual), and doing mathematics Knowledge (Problem solving). Most international and standardized mathematics tests nowadays are stressing on the conceptual test items. The connection of the mathematical concept to behavioural sciences, science, engineering, technology, or to art is paramount in this era. In this workshop we will differentiate between the four levels mentioned above, we will solve conceptual items covering most of the Lebanese mathematics curriculum. In addition, we will present some test items from the international tests and discuss them.

First, we will present the four levels of items as defined by the NCTM.
Give examples and non-examples so that the teachers get the idea of what is a conceptual test item and how can we differentiate it from other mathematical test items.
Second, teachers will solve individually or in groups conceptual test items pre-prepared for them covering grade 10 Lebanese program. The teachers not only should solve the problem but also they should specify to what mathematics concept the item belongs.
After discussing and giving the answers we will continue with grade 11 then grade 12 similar way.
At the end of the workshop if there is additional time we will show items from SAT and PISA with conceptual and applied nature.

Mathematics in Everyday Life

Amin Dinnawi , Beirut Annunciation College (BAC)-Lebanon
Hasan Dinnawi, Eastwood International School, Lebanon

The aim of this workshop is to share and investigate several real-life applications of Mathematics. Shifting paradigms from traditional ways of teaching to interactive and collaborative inquiry-based activities is easier said than done. This workshop provides a variety of mathematical real-life problems and teaching ideas to solve them. It also models the role of the teacher as a facilitator of the knowledge in the math classroom. A lot of studies reveal that students are more motivated to solve real life problems that they relate to, and hence they would be more motivated to learn problem solving skills. This workshop will engage the participants in

inquiry activities where they have to solve problems in real life contexts collaboratively just like it would happen in an actual Mathematics classroom. It also aims to portray the ways in which students construct their own knowledge, invent their own strategies and create novel solutions to problems as well as test their validity in the real life context. In closing, participants will also investigate some facts from ancient times and discussions will ensue on the importance of teaching students the epistemology of certain mathematical concepts.
Title: Mathematics in Everyday Life.

Introduction:

When we hear our students uttering the words: "How am I going to use this in my life?!", we realize that mathematics is not making sense to them. Our purpose in the 21st century is to connect and equip young mathematicians and teachers with tools that allow them to bridge mathematics to real life and therefore enhance students' critical thinking skills. It's about teaching them "how to think" not "what to think".

The role of mathematics, and this is the purpose behind our workshop, is to produce more citizens who are able to think critically and creatively, regardless of their career choices.

Albert Einstein once said: "It's not that I am so smart, it's just that I stay with problems longer". Linking mathematics to the real world enhances students' understanding and motivation to learn this discipline. In this workshop, we will be sharing some real life applications of mathematics and interesting facts and paradoxes that show the students the ways math can be projected into the real world. In addition to that, showing students meaningful connections between what they learn and real life may help them develop more appreciation towards the subject. It's all about sharing ideas, and this is one of the aims of this workshop.

Strategy:

- Did you know Gold is not only a metal; there's a Golden Number! Investigating the Golden ratio in real life around us.
- Why teach numerical sequences?!
    - ❖ Let's talk about Money (Compound interest)

- Counting
- Critical thinking Brain teasers
- The Montey Hall Problem (The time when probability was on TV!)
- Characteristics of multi-step problems
- Bees are engineers (Why use the hexagonal shape?)
- Al-Birouni's method for the radius of the Earth
- A Shepherd needs mathematics
- Discussion on Mathematical Induction

Description of the session:
The participants will be sitting in groups of four or five.

- The workshop will start with an introduction stating the purpose of the workshop and the importance of problem solving in Mathematics (5 min.)

- Activity 1: The Golden Number (10 min.)
- Activity 2: Numerical sequences and compound interest (10 min.)
- Activity 3: Interesting counting problems (10 min.)
- Activity 4: Two Brain teasers (10 min.)
- Activity 5: The Montey Hall Problem (10 min)

- Activity 6: Sample Multi-step problems (15 min)

    - ❖ Bees are engineers

- Activity 8: Al-Birouni's method for the radius of the Earth (15 min.)
- Activity 9: A Shepherd needs mathematics (10 min.)
- Activity 10: Discussion on Mathematical Induction (10 min.)
- Closing. (5 min.)
- Time for questions. (5 min.)
- Time for completing the evaluation sheet. (3 min.)

In conclusion, the activities done will be focused on certain concepts in mathematics and all the attendees will receive hard copies of those activities. We hope that teachers who attend would be able to apply the activities or similar to them in their own classes.

Using Seesaw for 6th – 12th Grade

Seifedine Kadry, Beirut Arab University, Lebanon

Seesaw is a platform for student engagement that inspires students of all ages to do their best, and saves teachers time! On Seesaw, students use creative tools to take pictures, draw, record videos and more to capture learning in a portfolio. Teachers, find or create activities to share with students. Families only see their child's work and leave comments and encouragement. The aim of the interactive hands-on workshop is to introduce this online platform to Grade 6^{th} to 12^{th} teachers.

Introduction

This is a hand-on workshop on how to use the Seesaw platform in teaching science and math. Seesaw is an online platform for student engagement

Strategy

I will create a class using Seesaw platform online, then give the participants code to join my class. The participants will be as a student so they login as a students and do the assigned activities.

Description of the workshop

I will cover the following topics in Seesaw:

- Intro to Seesaw

- Built-in creative tools
- Explore as a student!
- Classroom ideas for all subjects
- Questions and next steps

Conclusion

This is an important professional development workshop for teachers of grade 6th till 12th.

A New Interactive Digital e-Learning Tool to Promote Grade 9 & Grade 12 Student Understanding of Math & Physics

Ramzi Ataya, Mr. Daoud el Gharib, NEEDS company, Lebanon

Brevet and Baccalaureate National Examinations are the most crucial official exams that students shall consider during their journey towards university. A new approach method based on interactive digital e-learning has been developed to enhance teaching of curricular content for classes with official exams namely Brevet and Baccalaureate. This e-learning platform called "LEARNIT" can be used within schools' classrooms by teachers and outside schools by individual students. It is the 1st Online Training Program for Brevet/Baccalaureate National Examination, an innovative digital platform designed and projected by Intellectual Authoring and Academic Team to enable learners reinforce their knowledge and skills, and achieve success in national official exams. LEARNIT is an interactive multi-platform responsive portal that allows Brevet/Baccalaureate students to access Mathematics/Physics review materials, chapter exercises and trial exam simulation with complete detailed answer sheets, in French and English. All included exercises and trial tests are based on analysis of previous official exams and come in form of interactive exercises within review lessons, and four to five end unit exercises with detailed answer sheets. After completing all mini lessons, LEARNIT provides number of complete Trial exams to be solved with complete detailed answer sheets.

LEARNIT is a powerful learning tool that has proven its worth in several schools and helped students who joined our community of e-learners achieve concrete progress and improvement of their achievements in official exams. We expect more schools to join us in partnership for improving learning environment through state-of-the-art learning tools promoting 21st century learning methodology across students in Lebanon.

LEARNIT presentation and demonstration could always be held in multi-languages: Arabic, English, and French in order to convey the message properly to both the Francophone and Anglophone audience.

Introduction

Teachers and Students of Grade 9 and Grade 12 put considerable effort to ensure students success in the Lebanese Brevet and Baccalaureate national examination. In this proposal, we will present a new address method to teach curricular content for the aforementioned classes using the benefits of interactive digital e-learning, referred to in this document as "LEARNIT". LEARNIT is the 1st Online Training Program for Brevet & Baccalaureate National Examination, an innovative digital platform designed and projected by Intellectual Authoring and Academic Team to enable learners reinforce their knowledge and skills, and achieve success in the national official exams.

As an interactive learning system based on the concept of self-learning, LEARNIT puts technology at the service of teachers as well as students and makes it a powerful learning tool. It is accessible on computers, interactive boards, tablets, and even smart phones that are connected to the internet. The courses that are currently available are Mathematics and Physics for Brevet and Baccalaureate classes, available in English and French.
The workshop will provide participants with a clear overview of the platform and the interactive activities that are specifically designed to enhance the learning process transforming learners into knowledge seekers instead than simple recipients of knowledge. Participants will learn about the importance of interactive learning and self-learning.

Strategy
The Session strategy comprises 4 main parts: Theoretical, Interactive Application, Interactive Competition and Evaluation.

- Part 1: Theoretical (*Time ~ 20 mn – Person In Charge (PIC): Presenter*)
    - Presentation (*Time: 15 mn in English*)
        - What is LEARNIT
        - Digital Interactive Content
        - Advantages
        - How to reach the LEARNIT and Help Support
    - Discussion (*Time: 5mn*)
        - Question and Answer session.
- Part 2: Interactive Application for Math and Sciences courses - Grade 9 / 12 (*Time ~ 60 mn – PIC: Presenter & Participants*)
    - Presenter Live Demonstration of interactive content using LCD Projector, and Participant live hands-on using their own devices, for the following:
        - Review Lessons that reinforce Vocab, Concepts, and Application skills.
        - In-lesson Interactive Exercises.
        - Typical Official Exams Exercises related directly for each Lesson.
        - Four all-inclusive Typical Official Exams with Detailed Answer Sheets (steps & answer).
- Part 3: Interactive Competition (*Time: 35 mn - PIC: Participants*)
    - Competition for Participants considering the interactive content using either the supplied pads or their mobiles.
- Part 4: Evaluation Part (*Time: 5 mn in English- PIC: Participants*):
    - Input from Participants on the Evaluation sheet.

The presenter will analyze the session parts as they go, ensuring to keep the session on track.

Description of Session

The description of the session comprises the description of the four aforementioned parts:

Part 1: Theoretical Part:

The presenter will start the session with the Theoretical part, which will be a **Presentation**. In the presentation, the presenter will inform the participants about the new method to teach curricular content using the benefit interactive digital e-learning, and the relevant information. The presenter will introduce LEARNIT, the tool different categories, the content, the advantages, and other relevant information.

Part 2: Application Part

The presenter will initiate this part by distributing credentials to the participants to log in to LEARNIT online, and will make available some pads (or computers if available) to reach the on-line practice, if some participants prefer the pads' / computers' use. After the successful log in of all participants, the presenter will proceed with the **Live Demonstration** of interactive content using LCD Projector, while in parallel, the Participant **live hands-on** will be considered, using their own devices, or the pads / computers. In this session, the participants will be checking the interactive content covering the Review Lessons that reinforce Vocab, Concepts, and Application skills, the In-lesson Interactive Exercises, the Typical Official Exams Exercises related directly for each Lesson, and the Four all-inclusive Typical Official Exams with Detailed Answer Sheets (steps & answer). In this part, participants will take on the role of the teacher by ensuring the online prepared course content and questions cover the knowledge and concept of the course intended to be communicated to the students, and facilitate the teaching methods. In this part also, participants will take on the role of the learner by answering the online prepared questions. Discussion and benefits can be shared during this part, considered as an open session to fully understand the tool features, and to create greater understanding and knowledge of the subject. The participant will sense in this part how a user can grasp the information and reflect his understanding of the Mathematics and Physics concept, in an easy, smart and quick manner.

Part 3: Interactive Competition Part

The presenter will call all participants to participate in an **Interactive Competition** using LEARNIT, being logged in the LEARNIT link. The participant will sense in this part the instructiveness impact of the tool, where the user intelligence, knowledge, teaching and learning abilities will be highlighted. By the end of the competition part, the participants who got the target result will be recompensed. This part can be considered as an objective way to determine whether training achieved its goals.

Part 4: Evaluation Part

In this last part, the presenter will distribute the evaluation sheets to the participants, to get feedback from them on the training session itself if it was constructive, and to ensure that the participants themselves gained the needed knowledge as planned. Any new suggestions proposed or raised by the participants can be discussed separately or in group as the time allows.

Conclusion

We are reaching out to educators to embrace a new approach to teaching and learning. The aim of this presentation is to highlight the importance of making use of digital interactive e-learning

material. Participants will be provided with details how to access our portal and how to enjoy the previews and we remain available for any further inquiries at any time through our portal. All are invited to join our community of learners.

References

Below are two references that would be beneficial for further reading about the strategy presented in this session:

1. **LEARNIT.sorce.online**
2. **LEARNIT Leaflet (pdf document attached)**

Middle Years Program (MYP): A Promising Inquiry Approach in Education

Farah Abed Ali & Reem Halawi Wellspring Learning Community, Beirut, Lebanon

Nowadays many schools around the world are implementing the IB program. Some schools are integrating the IB learner profile within their national curriculum others are implementing the full IB program aiming towards IB accreditation. The IB starts with PYP; Primary Years Programme, the MYP; Middle Years Programme and the DP; Diploma Programme. Most schools in Lebanon, start with PYP from Grade 1 to 5. In grade 6, students shift to the national or American program till grade 10. In grade 11, students can either choose DP if the school offers, national or American high school program. MYP is a less popular program for grades 6 to 10, although the MYP incorporates most teaching and learning pedagogies implemented by other programs. Assessment in MYP is what characterizes the program and gives it its uniqueness. In MYP, students are assessed not only based on content and knowledge, but also based on their practical, analytical skills and their ability to reflect and relate science to the real world. The four assessment criterion include: Criterion A: Knowing and Understanding, Criterion B: Inquiring and Designing, Criterion C: Processing and Evaluating and Criterion D: Reflecting on the Impacts of Science. Scientific inquiry is an evident example to cater for the MYP approaches. MYP is not only featured by assessments, but also by the service learning students have to practice throughout the unit. The MYP programme prepares students to be 21st century citzens by arming them with the knowledge and skills to make connections between what they learn and real life-thus the STEAM approach is evident in all aspects of the programme.

1**. Introduction**:

The International Baccalaureate program is becoming one of the most popular and successful programs in education. More than 4700 schools worldwide are following the IB program approach. The IB program does more than what other programs do; the IB stimulates students' inquiry, to become caring and knowledgeable learners. It starts with the Primary Years Programs from grade 1 till 5, and then comes the Middle Year Program from grade 6 till 10 and ends with the Diploma Program in grades 11 and 12. As the inquiry approach is dominant approach in teaching and learning, and then IB is being incorporated in every program.

The MYP program follows a challenging pedagogy, where students play the role of caring, knowledgeable educators to become lifelong, internationally minded learners. The heart of MYP, is connecting the inside of the classroom to the real world in a reflective, creative and critical manner. Thus students become well prepared for the Diploma program and university life.

2. Strategy:
During the session, the participants will be introduced to the IB program in general, this includes the IB mission statements and why IB. Each program will be briefly described, before going deeply into the MYP. The session will focus mainly on "Science in the MYP". Participants will watch a video of students in the MYP sharing their experience and reflecting on the MYP. Participants will get the chance to familiarize with the MYP science assessments and approaches to teaching and learning.

3. Description of session: The presenters will introduce what the MYP offers the students through the presentation and by referring to the IB website and MYP science guide. Open discussions will be held, comparing the national curriculum in grades 6 to 10 to that offered by the MYP.
The Lebanese curriculum covers most of the principles and theories taught in foreign countries. It is prepared in combination with the French program. The integration of the Lebanese program with the IB program will prepare the learners to a high level of education, to be involved easily in the most universities in the world. This integration will make the IB program more popular in the Lebanese schools. Also, the Lebanese schools will benefit from the IB program which is based on practical skills what characterizes the IB program and it is not found in the Lebanese program.
Samples of assessments in sciences (mainly biology and chemistry) will be offered with detailed explanation of the criteria used for correction and standardization. Participants will get to know more about "Service learning" in the MYP; they will watch a short movie about a service learning activity done in Lebanon by MYP year 4 students. Participants will check samples of students' work in different years of the MYP. Participants will be asked to prepare their own assessments including the four criterions in MYP and reflect on their experience compared to tests and/or quizzes prepared at their schools.
4. The MYP program in its nature is designed around approaching the units from a global context and making connections between disciplines which is at the heart of the STEAM approach. Units are explored from different perspectives which enables the students to understand the concepts and to relate them to the real world-as they really are. At least two of the STEAM concepts are linked in each unit and at least twice a year an interdisciplinary unit is prepared which brings the knowledge acquired in 2 or more disciplines into one unit that culminates in a final product be it a project, model or a demonstration.

4. Conclusion:

The MYP is not well known among schools in Lebanon, thus it is poorly practiced. After the session, participants will be prepared to develop new techniques in assessments to ensure a fair evaluation for all students with hybrid abilities. The MYP not only delivers content but tackles students' personality and wellbeing. The MYP builds confident, principled and balanced lifelong learners. Sciences in the MYP is a rigorous field of study; this is why the focus will be on MYP sciences.

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Science Thinkers: PBL in Science Classroom

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Twenty-first century skills necessitate the implementation of instruction that allows students to apply content, collaborate, take ownership of their learning, and use technology meaningfully. Problem-Based Learning (PBL) is one pedagogical approach that provides a structure for discovery, helps students internalize learning and leads to greater comprehension. Moreover, it encourages independent responsibility for shared learning and allows for the development of all essential skills for future practice. Participants will take the role of "elementary students" who work cooperatively to solve open ended problems, and the role of educators to plan together for a PBL topic to be used in their science classrooms in order to improve students' engagement in the learning process.

Learning facts is less and less relevant in a world where Google can satisfy just about any question in a matter of milliseconds. It is skills that will enable children to succeed. Twenty-first century skills necessitate the implementation of instruction that allows students to apply science content, take ownership of their learning, collaborate and use technology meaningfully. Problem-Based Learning (PBL) is an instructional method of hands-on and active learning that can promote the development of students' key skills relevant to their future careers and lives such as: critical thinking and creative skills, problem-solving skills, information seeking skills, presentation skills, meta-cognitive skills, collaboration and communication skills. Furthermore, PBL is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material, it is an inquiry-based instructional model in which authentic problems require further research and it is an exciting way to learn. Through collaboration and inquiry, students can apply their learning to develop solutions and present their findings, they will be well engaged in learning and motivated

intrinsically. Problem-based learning has been the one of the most important recent developments in education. It started with medical education in North America and has spread across the globe and across all the classes' levels. It can be incorporated into any learning situation and any subject area with a little creativity. PBL assignments can be short, or they can be more involved and take a whole semester. This pedagogy represents a paradigm shift of teaching and learning: Rather than lecturing and providing facts and then testing students' ability to recall these facts via memorization (traditional learning), PBL allows students to face contextualized, real-life, ill-structured problems and are asked to investigate and discover meaningful solutions. PBL thus has a constructivist view of learning as the learners are constructing their own knowledge together, they also activate their prior knowledge and build on existing conceptual knowledge frameworks. So, in PBL the teacher acts as a facilitator and a mentor rather than a source of "solutions." She / He facilitates learning by supporting, guiding, and monitoring the learning process and promoting an environment of inquiry. The teacher builds students' confidence to take on the problem, and encourages the students, while also stretching their understanding. Besides that, teacher's guidance and interference depends on students' levels and how many times they have applied this method. Teachers can begin to design, implement, and assess PBL in their own subjects by following the next steps: (1) Identify outcomes and objectives: Articulate the learning outcomes of the Unit. What do you want students to know or be able to do as a result of participating in this method? (2) Form Small Groups: Students must form small groups of 3-5 students, teacher can assign the groups or by lottery. Students should decide upon group roles and assign responsibility for researching topics necessary for them to fully understand the problems and then comes to consensus within the group. It is focused on the students' reflection and reasoning to construct their own learning. (3) Present the Problem: The presented problem should be a real-world situation that resembles something students may encounter in their future careers or lives (not teacher's exercises). Cases are often the basis of PBL activities. Problems should be motivating, interesting, and generating good discussion. If PBL is new to students, teacher can practice with an "easy problem". The problems can come from a variety of resources: newspapers, magazines, journals, books, textbooks, and television/ movies. Some are in such form that they can be used with little editing; however, others need to be rewritten to suit the topic. Furthermore, teacher should introduce good research questions, the assignment expectations, rubrics, and timelines. (4) Activate the Groups: Ask the groups to brainstorm possible solutions. Each group will have to discuss, review, or investigate the hypotheses and rank them in order of priority and prepare requests for more data. The teacher circulates among the groups, providing assistance but not solutions. Moreover, he/ she can identify key resources for students who need to learn to identify and utilize learning resources on their own, but it can be helpful if the teacher indicates a few good sources to get them started. Many students will want to limit their research to the Internet, so it will be important to guide them toward the library as well. (5) Provide Feedback: The key to managing a PBL session is providing continual feedback to maintain student enthusiasm while simultaneously prolonging the resolution of the problem to ensure that adequate learning occurs.

(6) Ask for a Solution: After researching, the students create solutions and presentations that synthesize their research, findings and learning. When a reasonable number of groups have solved the problem, teacher might request a brief written analysis from each group describing the solution and data. Teacher may ask students to include certain key words in their reports. (7) Assessment: During the PBL assessment step, teacher should evaluate the groups' products and performances, use rubrics to determine whether students have clearly communicated the problem, background, research methods, solutions (feasible and research-based), and resources, and to decide whether all group members participated meaningfully. Teacher should consider having his/ her students fill out reflections about their learning (including what they've learned about the content and the research process). Teacher can give, for example, 20% of students' grade to ppa: preparation, participation, and attitude.

Since in PBL students are engaged in knowledge construction, they generally should:

1. Examine and define the problem:

Students discuss the "ill-structured" problem, presented by their teacher, and list its significant parts.

2. Develop, and write out, the problem statement in students' own words:

Students will need: a written statement, the agreement of the group on the statement and feedback on this statement from the teacher.

3. List "What do we know?"

What do students know to solve the problem?

This includes both what they actually know and what strengths and capabilities each team member has.

4. List out possible solutions

Students should list them all, then they order them from the strongest to the weakest

5. List actions to be taken with a timeline: What do we need to know and do to solve the problem?

- Discuss possible resources: Experts, books, web sites, etc.
- Assign and schedule research tasks, especially deadlines
- In this step, the group is divided into different sub groups and each sub-group is concentrating on the different factors needed.

6. Solve the problem and present the solution

Students re-group to discuss their findings, they share information, teach each other the findings, and work together on the problem. Then, they present their findings that synthesize their research to their classmates. This should include the problem statement, questions, data gathered, analysis of data, and support for solutions or recommendations based on the data analysis: in short, the process and outcome.

7. Review the performance

They review what they have learnt from working on the problem. All who participated in the process engage in self, peer and tutor review of the PBL process and each person's contribution to that process.

However, Problem based learning has few disadvantages: 1-Time-consuming: Teachers must often invest more time to assess student learning and prepare the needed materials to learn. Teacher adopting a PBL method may not be able to cover as much material as a conventional to traditional learning.
2-Traditional assumptions of the students: Most of the students might have spent their previous years of education assuming their teacher as the main disseminator of knowledge. Because of this understanding towards the subject matter students may lack the ability to simply wonder about something in the initial years of problem-based learning. 3-Educator facilitation: It requires more staff to take an active role in facilitation and group-led discussion. It can be difficult at first for the teacher to alter their past habits and become a facilitator, encouraging the students to ask the right questions rather than handing them solutions, giving only hints to correct their mistakes and guiding the students in their research.
4-Pupil's evaluation: The instructors have to adapt new assessment methods to evaluate the pupils' achievement. They have to incorporate practical examinations, peer and self assessments, etc.
5-Utilization of resources: Since it is self-directed method, the students may not be sure of what information is relevant and important unless they are properly guided by the educators. It is resource-intensive because it requires more physical space and more accessible computer resources to accommodate simultaneous smaller group-learning.
These disadvantages should not be an obstacle to apply PBL in our classrooms since they can be solved: teachers can implement PBL two times during the academic year: once in every semester, they can start with easy problems if the students are new to PBL, they can be assistant to each other: they can enter the classroom together in some PBL sessions. Last, they can work cooperatively to prepare many resources and rubrics to assess students' work. The aim of this workshop is to shed light on the importance of PBL and how to implement this method in the elementary science classes thus to enhance students' understanding of knowledge and allows the development of necessary skills for future practice. The session is planned as follows:

1- Ice breaker activity + Expectations (8min)
2- Participants solve in groups Frayer Model to define PBL and then discussion and explanation take place. (15min)
3- Brief discussion of the history of PBL and how it is based on constructivism theory. (6min)
4- Discuss teachers' role and how to plan for a PBL topic. (12min)
5- Discuss the steps that students should follow while applying PBL method. (15min)
6- Participants work, as learners, cooperatively to apply this pedagogy and find solutions for some real-life problems, (every group will work on a different problem) and then

presentation takes place. Also, they will be provided with different resources, worksheets, questions and rubrics to apply PBL easily and correctly. (25min)

- Your grandma has a garden near her house. She has hens and a rooster in the garden. Every day, she enters the den and takes out the eggs for breakfast. In summer, she went on a trip with her daughter to Turkey. They stayed there for 10 days. When she came back home, she collected the eggs and put them in the fridge. She took an egg to be fried. When she opened it, she found an embryo. She threw it and felt sad. She was shocked and she didn't know what to do. Help your grandma to solve this problem, to know more about birds' reproduction and how to distinguish between fertilized and unfertilized eggs, in order not to be repeated again with her.
- European countries refuse to import Lebanese fruits and vegetables because of the excessive use of pesticides and polluted water that affect biotic and abiotic factors. Due to this, farmers lost a lot of money and their crops remained without marketing abroad. Try to help farmers find a solution for this problem and make their crops compatible with international criteria.
- Lebanon is still using fuel to produce electrical energy which reaches our homes around 10 hours per day. This electrical energy becomes an essential part of our daily life since most devices need it to change into other forms of energy while working. Try to help the electrical minister to find a solution for this problem: You have to provide him with other resources of energy, friendly to the environment, and to explain how they work and change to other forms of energy.

7- Participants work in groups to deduce the advantages and disadvantages of this method, then carousel strategy takes place and then discussion occurs. (15min)

8- Participants work cooperatively, as educators, to prepare other problems to be applied in their science classes and then gallery walk takes place (20min)

9- Evaluation of workshop and distribution of handouts (4min)

Conclusion:

Problem-Based Learning (PBL) is a teaching method in which complex real-world problems are used as the vehicle to promote student learning of concepts and principles as opposed to memorization, direct presentation of facts and concepts. It also urges learners to use high-level thinking skills, which require them to analyze, create, defend, or evaluate. Students find PBL experiences more engaging, motivating, and fun since they are socially active and learn to work as part of a group, asking and answering questions and supporting others' thoughts. Finally, John Dewey said: "True learning is based on discovery…rather than the transmission of knowledge."

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Creating a Constructive Communication in a Science Class

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It is not a secret that we are social creatures; we communicate for 7 out of every 10 minutes we are awake in average, and we are expected to stay social in our classes. Communication is a cornerstone in every class we teach, and in sciences it is the major tool that keeps the class going. Teachers are constantly working with diverse groups, where the language they use in class can either be the key or the road block to students' understanding. Students come from different backgrounds and have tricky ways of expressing themselves as well as their thoughts and ideas. It's our job to look up ways to understand their languages and channel them in a way that serves us and the educational process. This workshop aims to shed the light on ways to encourage positive, constructive communication in a science classroom and consider ways to benefit from such communication.

1. Introduction:

Benjamin Lee Whorf, an American linguist observed in 1940 that people who speak Whopi, a now-extinct native American language see the world in a way different from how English speakers see it. Some languages would give its speakers a varying perspective of colours, locations and even sense of time. There is a growing argument that the language we speak and study in helps improve or hinder our understanding.

And while communication is a cornerstone in a successful classroom environment, choosing the right, smart, easy-to-everyone mean and language of communication cannot always be an easy task. The importance of communication between students and teachers and between students themselves cannot be underestimated. On the contrary, it needs to be used to increase the intensity of learning moments and to boost learners' enthusiasm, self-confidence and comfort to share their ideas, understandings and concerns. Pat Petrie in Communication Skills for Working with Children and Young People: Introducing Social Pedagogy says that communication is probably the most important form of pedagogy.

Although it might seem like class discussions happen all the time, communication is not always present. We need to bring communication into each and every class we teach. When constructive, communication is a win-win situation to both teachers who get to easily discover the students' points of strength and points of weakness and to students' who feel involved and important. It is perhaps professional development at its best.

2. Strategy: Participants will be working in small groups and will be continuously involved in interactive activities.

3. Description of session: The activities are intended to go as follows:

- Icebreaker: ask each of the participants to write four facts that include one that is incorrect about them, then they need to be paired up and ask the person they're paired with to guess which facts are true and which are not. Then ask pairs to share their experiences. (10 minutes)
- Modes of communication:

- ✓ Students are very affected in what we say to them and how we say them. Use the drawings of students to demonstrate this effect. Discuss whether this influence is prominent as much in students of bigger age groups. Mention the personalized handshake trend. How can we benefit from this effect that we have on students? (5 minutes)
- ✓ How do students communicate with each other and with teachers: email, social media, Moodle, office hours? Which is fine, and which is not? Arrange these methods from the most favourite to the least favourite. (5 minutes)
- ✓ How do we evauate students' understanding? What signs do they give us? How easy is it to receive these signs? Use a flip chart to write down suggestions. (5 minutes)
- ✓ Importance of reflection: When, why and how should students reflect? How to use their reflections as assessment? Share samples of students' reflections. (5 minutes)
- ✓ Student group work: Collaborative, cooperative? How to make sure students work well in a group? Especially in a project or in a lab? Look at Google Docs and think how they can be used, also have a carousel activity set to answer related questions. (5 minutes)

- How do we encourage students to communicate with us?
  - ✓ Students need to positively question what teachers say. Use examples of banning dihydrogen monoxide and a traditional suggestion of how to remove an earthworm from your intestines. Comment with (cardboard) thumbs up or thumbs down to whether skepticism should be nurtured in a science class. (5 minutes)
  - ✓ We cannot run away from lecturing in class. How can we make it more effective? How can we make it more engaging? Also, discussions: How often should they happen in class? How to encourage them? How to stop them from going out of control? (Use coloured faces to diversify groups) (10 minutes)
- Does the language of delivery affect the degree of student involvement? Do students who come from the same language background share similar educational habits? Use the Chinese example. Have questions in different languages on the ground, ask participants to stand on the question they want to answer, then have them discuss answers to it and share the findings they come up with. How can we help students answer questions they want to answer but still not go astray from the topic in hand in class? (10 minutes)

4. Conclusion: Use Padlet or Kahoot! to throw in comments (ask participants to scan the QR code and encourage them to use it in their classes), or use papers and pegs to hang them. Talk about SurveyMonkey and Google Forms as an effective tool to see where students stand as well. (10 minutes)

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Innovative Idea Sessions

Will it crack? A STEM project based learning activity

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- What does a STEM project based activity really look like from beginning to end? In this workshop, participants will experience STEM project based learning through a hands on activity. Participants will also learn how to design and manage project based learning activities in their classrooms. The discussion will focus on a) the advantages and barriers to implementing similar activities in the classroom b) how to integrate language in the content areas based on the "Content Language Integrated Approach" (CLIL).

- **Introduction** In this activity, participants will design a way to help NASA's rover land safely on mars using the provided materials and guidelines
- **Strategy**: Participants will learn how to design and manage project based learning activities by experiencing an STEM PBL activity from beginning to end
- **Description of the session:**
- * Intro to STEM project based learning and interdisciplinary activities. Myths and facts. (10 min)
- * Introduction of the activity (5 min)
- * Designing phase (30 min)
- * Testing Phase (15 min)
- * Discussion (15 min)

i Student- i Teacher

Mirna Faour, M. Ali Reda, Institution Educative Amal, Lycée Hassan Kassir, Beyrouth , Liban

Les époques sont distinguées au courant de la vie de l'homme par les divergences générationnelles. Une des manifestations de ce phénomène trouve un terrain fertile dans le domaine de l'enseignement, où l'association entre l'éducation et l'apprentissage n'a jamais connue une cohabitation distingué par la sérénité. La diatribe se traduit sur les méthodes et les moyens à adapter pour garantir un équilibre entre le savoir et le savoir-faire. Les lieux où ça s'est manifesté ont eu espace dans : la maison, l'école, la société et la politique…

Les connaissances descriptives, les technologies et les méthodes d'organisation utilisées par les éleveurs dans la gestion de leurs ressources naturelles, ont évolué et ont été transmises de génération en génération. On parle toujours des moyens par lesquels les connaissances sont transmises aux jeunes et fixées dans la mémoire des anciens. L'une des questions essentielles auxquelles l'éducation et la formation doit répondre aujourd'hui celles de l'introduction du système d'enseignement moderne de type scolaire ainsi que les difficultés rencontrées pour atteindre les populations pastorales.

Les emblèmes du fond de chaque prof :

✓ Les choix des institutions relatives aux méthodes et moyens politiques de l'enseignement.

✓ La relation avec tous les autres acteurs (la famille la société, l'économie…)

✓ La disponibilité de moyennes propédeutiques à l'enseignement.

✓ Nombre croissant d'élèves peu motivés par l'effort, plutôt passifs !!

Comment faire évoluer le modèle scolaire actuel pour remédier à ce constat ?

De nombreuses expérimentations sont actuellement menées à différents niveaux d'enseignement, mais les principes et les résultats de ce mode d'enseignement restent pour l'heure sujets à débat. La classe inversée « Flipped Classrooms »est une forme d'organisation d'enseignement qui propose de fournir aux élèves des éléments de cours, le plus souvent sous forme numérique (capsules vidéos, etc.) pour qu'ils l'étudient chez eux, le temps de cours étant ensuite consacré à des exercices, travaux de groupes, aides individualisées. Un mélange fertile de la transmission directe (j'enseigne) avec une approche constructiviste ou encore socio-constructiviste de l'apprentissage (c'est aux apprenants qu'il revient d'apprendre). Une classe où les étudiants sont davantage engagés dans leurs apprentissages.

Innovation pédagogique –Principes de la classe inversée :

✓ Aider les élèves à maintenir l'effort et la motivation.

✓ Permettre aux élèves performants d'approfondir (activités plus complexes en autonomies)

✓ Apprendre à travailler en groupe et à s'entraider

✓ Gérer son temps et organiser son travail

✓ Développer une utilisation raisonnée des TICE

✓ Eviter l'idée de fatalité, qui peut engendrer un découragement des équipes

✓ Mieux accompagner les élèves, apporter l'aide pendant les cours

✓ Elargir son approche pédagogique

Introduction:
Dans le système éducatif, l'opposition entre les méthodes traditionnelles et modernes est toujours d'actualité. La **Pédagogie traditionnelle** est celle du modèle transmissif qui peut être considérée comme une pratique où les apprenants se trouvent dans une certaine passivité. L'enseignant dans cette pédagogie est le seul détenteur du savoir. Autrement dit, l'enseignant expose un savoir sous forme de cours magistral, généralement suivi d'exercices ou/et de leçons à apprendre.
Dans un souci de recentrer l'apprentissage sur l'apprenant, émerge une approche pédagogique dite **Pédagogie inversée (« flipped teaching »)**. Celle-ci induit des changements pour l'exercice de la professionnalité enseignante. Cette forme pédagogique permet d'individualiser et de différencier
l'enseignement, favorise le tutorat par les pairs, permet de développer l'autonomie des élèves par la mobilisation des connaissances dans les activités de mise en pratique et d'approfondissement, avec la différenciation pédagogique qui peut être pratiquée par l'enseignant.
Le concept de **Classe inversée** décrit un renversement de l'enseignement traditionnel.
Les étudiants prennent connaissance de la matière en dehors de la classe, principalement au travers de lectures ou de vidéos. Le temps de la classe est alors consacré à un travail plus profond d'assimilation des connaissances au travers de méthodes pédagogiques comme la résolution de problèmes, les discussions ou les débats

Planification stratégique:
Le cadre conceptuel comprend :
✓ Les théories qui concernent la communication, l'éducation, l'instruction.
✓ Les nouvelles formes pédagogiques.
✓ La TICE (Les technologies de l'information et de la communication dans l'enseignement)
✓ La sociologie.
✓ L'économie.

Objectifs :
✓ Permettre aux élèves de prendre conscience de leur responsabilité dans le processus de l'apprentissage.
✓ Différencier et individualiser l'enseignement.
✓ Dynamiser et rendre attractive l'acquisition des connaissances et des compétences élémentaires pour les élèves les plus faibles.
✓ Aider les élèves à maintenir l'effort et la motivation.
✓ Développer une utilisation raisonnée des TICE.

Participants :
La direction de l'institue, les enseignants, les classes par section, les familles, IT de l'école et les coordinateurs des matières.
Les outils :
Active board, LCD, PC, I Pad, Smart phone, Camescope, Server central, Printer, Outils didactiques traditionnels: papier, crayon…

MOTS-CLÉS :
classes inversées, dispositif, typologie, méthodes pédagogiques, effets, différenciation, apprentissage, apprendre à apprendre.

Récolte des données :

✓ Intervention rapide sur la matière (et sa pratique) non comprise et ce, durant le cours, sans devoir attendre une éventuelle remédiation structurelle.

✓ Participation et autonomie accrues des élèves.

✓ Performance et effets produits par l'inversion.

✓ Développement des compétences pour les étudiants plus avancés.

✓ Matériels didactiques engagés et utilisés.

✓ L'impact relationnel entre enseignant et élèves

Déroulement :

Présentation de la session :

Il est assez rare qu'une classe à laquelle nous enseignons soit homogène. Dans la plupart des cas, elle est constituée d'élèves performants, mais aussi d'élèves en difficulté plus ou moins importante face à la matière enseignée. Une approche traditionnelle ne permet pas de satisfaire les besoins spécifiques de chaque élève et le risque est alors d'en « **perdre** » un certain nombre en cours de route !

L'idée consiste donc à **inverser** le concept traditionnel de **la classe** et d'ainsi rendre l'élève le plus actif possible durant le temps qu'il passe en cours.

Cette forme de pédagogie permet également et surtout de répondre aux **besoins** spécifiques de chaque **élève.**

Discussion initiale à titre exploratif avec le public présent pour tester le niveau de la connaissance des méthodologies de l'éducation et de l'enseignement temporelles.

Expérimenter le jeu de rôle entre les participants (enseignant / élève).

Comment réaliser une typologie des classes inversés :

La notion de classe inversée recouvre une multitude de réalités avec une large gradation dans l'autonomie dévolue aux élèves, jusqu'à des cas où les élèves déterminent eux-mêmes (mais en accord et avec l'aide de l'enseignant) comment ils vont atteindre les objectifs d'apprentissage.

Une solution intermédiaire existe : la **classe inversée** par maîtrise des compétences. Dans ce cadre, un parcours pédagogique est proposé par l'enseignant, mais la seule obligation pour l'élève est la validation de compétences à des étapes régulières. Cette méthode pédagogique permet de développer l'autonomie des élèves par la mobilisation des connaissances dans les activités de mise en pratique et d'approfondissement, avec la différenciation pédagogique qui peut être pratiquée par l'enseignant. Mettre à disposition de la classe les moyens et les instruments qui permettent à chacun des élèves de rejoindre l'objectif de ce qu'on peut appeler : **« apprendre à apprendre »** où l'élève développe ses potentiels intellectuelles de la recherche et d'être capable de renverser le jeu de rôle (prof / élève et **médiateur de savoir**).

La classe inversée consiste à mettre à disposition des élèves des ressources en ligne, et de réaliser les exercices en classe :

✓ Ressources préparées par l'enseignant

✓ Ressources préparées par l'élève

✓ Approche mixte

Mise en pratique
1) A la maison:

L'élève visionne une capsule **vidéo** présentant la théorie de la nouvelle matière à aborder. Cette étape est immédiatement suivie d'un questionnaire destiné à vérifier par le biais d'exercices d'applications simples son niveau de compréhension.
2) En classe:

Disposition libre des élèves en «îlots» pour la première séance en classe :
Cas1 :
Quelques élèves rencontrent des difficultés liées à un point de matière. Les îlots peuvent alors être constitués d'élèves en difficultés associés à d'autres ayant compris et pouvant les aider. Le professeur est aussi disponible pour les aider de manière individuelle pendant que ceux qui ont compris et ne s'occupent pas de condisciples réalisent des exercices d'application de niveau supérieur (avec corrigé à disposition).
Cas2 :

Disposition plus réfléchie des îlots (élèves en difficulté associés à ceux qui maîtrisent mieux)
Début du travail sur les tâches complexes liées à cette matière. La constitution des îlots évolue car si les élèves qui maîtrisent mieux aident les autres, le but est qu'un certain nombre de ces derniers puissent aussi venir en aide à leurs condisciples! Parallèlement, les élèves dont l'évolution dans la matière est favorable peuvent aussi s'isoler pour réaliser des tâches complexes de niveau supérieur!

Visée pédagogique
La Taxonomie des objectifs éducatifs est reconnue dans le domaine de l'éducation. Les enseignants utilisent souvent la **taxonomie de Bloom** pour créer des résultats d'apprentissage qui ciblent non seulement la matière mais aussi la profondeur de l'apprentissage qu'ils veulent que les élèves atteignent.
Une différence qui paraît aller de soi mais qui, si on l'assimile jusqu'au bout, a des conséquences sur le regard que l'on peut porter sur les pratiques de classe et le rôle de l'enseignant en particulier avec le courant pédagogique de la Classe inversée . En effet, ce dernier met en lumière une autre manière d'**appréhender les processus d'apprentissages** par le biais de nouvelles stratégies éducatives (fondées sur les théories socio-constructivistes).
Le renversement de la taxonomie de Bloom prend sa source d'une observation des comportements des élèves durant ce scénario d'apprentissage : Pour en revenir à la taxonomie de Bloom, il est également possible d'inverser la pyramide... Cette inversion a donné naissance à l'approche par problème. Les élèves débutent et passent la majorité de leur temps en création et en évaluation, et lorsqu'ils sont prêts, ils poursuivent la séquence d'apprentissage vers le bas de la pyramide pour finalement étayer leur compréhension d'un phénomène et mémoriser le contenu disciplinaire y étant associé

Conclusion
Contrairement à l'idée reçue et largement repandue que les étudiants sont des digital native et dès qu'ils sont face à un clavier ils sont autonomes, il faut former les apprenants à tous les usages et surtout en passant par chaque niveau de difficulté sans brûler les étapes.

Notons finalement : *« trop d'innovation, tue l'innovation »* comme le dit Jean-Louis Ferrarini. Au contraire, il faut avancer pas à pas, s'approprier le peu d'outils dont on dispose au début et l'expérience fera le reste.

Gestion de temps :
Introduction : 5 min
Présentation du programme: 20 mn
Jeu de rôle : 20 mn
Discussion: 30 mn

صغار القصص تعلم الرياضيات

نور المصري و فاطمة جمعة

1-التعرف على أهمية الرياضيات والغاية منها في قسم رياض الأطفال

2-التعرف على أهمية الأعداد، الخطوط، الاشكال الهندسية وطرق توظيفها.

3-التعرف على دور استراتيجية حل المشكلات في تنمية المهارات الفكرية والتحليل من خلال الانشطة الرياضية.

سير الورشة:

1- نشاط كسر الجليد يقدم عبر المنشط مع المشاركين

2-مقدمة عن الرياضيات في مرحلة رياض الأطفال تقدم عبر المنشط عبر عرض نظري مع مداخلات المشاركين بشكل فردي (مدة 10 دقائق) .

3-تقديم بعض أسماء الاستراتجيات وأهميتها تقدم عبر المنشط عبر عرض نظري مع مداخلات المشاركين بشكل فردي (مدة 10 دقائق).

4-نشاط عملي حول استراتيجيات حل المشكلات ربطا بهدف رياضي حيث يقسم المنشط المشاركين الى مجموعات ويطلب المهام التالية:

أ-كل مجموعة ستقوم بتأليف قصة (يكون فيها مشكلة) وتقدم الهدف الرياضي باتباع خطوات تعليم المفهوم الأربعة(تقديم-تدريب-تطبيق-تقييم) مع التركيز على تصنيع أنشطة حسية \ألعاب تربوية (مدة 45 دقيقة).

ب-كل مجموعة ستقوم بعرض القصة والأنشطة\الألعاب المرتبطة بها وستكون هناك مناقشة لكل عرض (مدة 60 دقيقة).

A website teacher: Just-In-Time Teaching (JITT).

Abir El Darwish, Amal Educational Institutions, Beirut, Lebanon

The frame work for twenty first century learning is based on life and career skills, learning and innovation skills, information, media and technology skills. JITT is an active learning method using a brief web-based questions delivered to the students before a class meeting, then, the students answers are reviewed by the teacher before the class and they are used to develop classroom activities. JITT is a pedagogical strategy that promotes active students engagements and motivates students by linking out-of-class JITT exercises linked to JITT responses and classroom activities, it creates a challenge for the students to search new information about new topics, the students answer a small set of web-based questions on upcoming course material outside the class and submit their responses online. The instructor reviews the students JITT responses and develops in class active learning exercises targeting learning gaps identified in the JITT responses. JITT provides twenty first century skills for learners by analyzing data (critical thinking),answering (problem solving), discussing the answers (cooperative learning) and reflective skills (self-directed and self-monitoring skills).

- **Introduction**

  The international philosophy is based on "lifelong employability and lifelong learning". Learning and teaching must provide the learners with the twenty first century skills. JITT is an active learning method that transforms the learners from consumers to active and interactive individuals, it is a learning method using a brief web-based questions delivered to the students before a class meeting, the students answers are reviewed by the instructor in order to develop a classroom activities.

- **Conceptual framework**
  - Learning, collaborating, connecting.
  - Reflective practice.
  - Team work in class and later in jobs.
  - Lifelong learning and lifelong employability.

- **Objectives**
  - Motivate the learner to search in order to have the correct information.
  - Know the use of internet.
  - Stimulate the cooperative learning.
  - Encourage the cognitive engagement.

- **Participants**

  The direction of the school, IT department, learners, instructors and the coordinators of the materials.

- **Tools**

  LCD, PC, internet, papers, pens.

- **Development**
  - The difference between the traditional teaching and JITT method is:

  Traditional teaching: come to class→ stock the lecture→ read the text→ do the homework.

  JITT method: read the text→ do the quiz→ come to class→ custom activities or a lecture.
  - The participants will be informed about JITT method by showing a power point concerning what –how and why questions about JITT method.
  - Pedagogical view

  JITT method can be applied in order to create an active classroom providing 21st century skills.

  JITT method makes a change in the process of education, this change permits passing from teacher-centered classroom to learner –centered classroom.

  The importance of JITT is based on many reasons:

  For learners: JITT method: communicates high expectations-motivates learners to search –create reflective learners.

  For instructors: JITT method: allows understanding misconceptions and gaps of the learners-emphasizes formative assessments-provides a variety of teaching activities.
  - Showing examples about JITT questions and answers.
  - Doing an activity with the participants by asking group of them to prepare JITT questions for a lesson in a specific level and the other group to answer on these questions by playing the role of the learners.
- **Results**

  JITT method is still in the process of completion and application. There is a big difference in the environment of the classroom in the interaction of the learners and their participation.
- **Discussion**

  Doing an open discussion between the presenter and the participants.
- **References**

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  - Henderson, C.& Rosenthal, A.(2006) journal of college science teaching 35 (7),46-50.
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PLENARY SESSION 3

(Arabic) School Mathematics Discourse as Communication

Jehad Alshwaikh, Birzeit University, Palestine

In this talk, I reflect on my research on three aspects: (1) Representation and communication of mathematics: here, I try to answer some questions such as: how does this mathematics is presented in Arabic mathematics discourse (e.g. textbooks, teaching, etc.)?; what is/are the role(s) of learner of mathematics? Here I use Social Semiotics to analyse mathematics as communicative discourse in which different modes are used to represent mathematics such as language and diagrams. (2) Mathematics teacher education, where my focus is on analysing the discourse of teaching in mathematics classrooms relying on Mathematics Discourse in Instruction (MDI) to analyse the mathematics available for students to learn. (3) Connecting mathematics education to society and socio-political aspects such as social justice (access and quality). Furthermore, I share some results/examples from my research on Palestinian context. I finish with reflection on this journey (so far) and what next.

PLENARY SESSION 4

The Secret Life of Plants: Documentary Screening and Introduction to AUB as a Botanic Garden

Tamer Amin & AUBotanic, American University of Beirut

AUB has recently been designated as a botanic garden to showcase, preserve and enhance the educational opportunities of its large collection of plant species. In this session, participants will be introduced to the AUBotanic initiative and the educational activities that are being organized that schools can take advantage of. In addition, there will be a screening of the documentary film "Solving the Secrets," Part 2 of the "Kingdom of Plants" series prepared and presented by the world-renowned naturalist Sir David Attenborough. In this documentary, with the aid of sophisticated visual effects, he describes the secrets of plant movement and scent, hidden links with the world of insects, and even a specimen that has "the power of mind control."

Developmental Workshops

Coding with Scratch

Rana Kaoury, International College, Lebanon

Mitch Resnick of MIT lab said during one of his TED conferences that "young people today have lots of experience and lots of familiarity with interacting with new technologies like texting, chatting and gaming, but a lot less so of creating and expressing themselves with any of these new technologies they are interested in. It's almost as if they can read but not write." According to code.org "71% of all new jobs in STEM are in computing, but only 8% of STEM graduates are in Computer Science". As educators, it is important to stay up to date on these innovations, as it is our responsibility to prepare students and help them have a better and brighter future, by introducing programming, a skill they will use in the future. This workshop introduces participants to Scratch. Scratch is a simple block-like interface or tool that is often used in teaching coding, computer science and computational thinking. From programming websites, to games and finally artificial intelligence, Scratch is a simple language that works well for introductory programming where students can drag-and-drop icons instead of typing the code. Scratch is an easy way to introduce coding in our schools because it fits all ages and it makes coding as easy as stacking building blocks. In addition, it helps students learn to think creatively and reason systematically.

Introduction:

In 2012, Estonia launched a pilot program to teach programming to all students. In 2014, programming was introduced in English and French schools. Australia followed suit in 2015. In the United states, they are trying to make computer programming part of the core curriculum. Hence, it seems that teaching kids how to code is essential to 21st century learners. As programming is the future and coding jobs are growing in number, it is not a trend that will fade. When students learn to code, they learn important strategies for solving problems, designing projects and communicating ideas. Coding helps kids develop academic skills, build qualities like perseverance and organization, gain valuable 21st century skills, and can even translate into a career.

Strategy: **To attend this workshop participants should bring their own laptops and download the software Scratch. Teachers can download it for free online.**

This workshop introduces participants to coding and the importance of teaching students how to code. The coding program that will be used is the language Scratch. By working in pairs or individually, teachers will be able to create scenes, simple games and solving Math problems using Scratch. They will also learn how to read and write a script, and identify and correct errors in the code (debugging).

Description of the session:

Why and benefit: after the introduction, we will start the session by a discussing on why we are teaching Scratch and by identifying the benefits of teaching students how to code.

- facilitating Computational Thinking
- promoting 21st century skills (4Cs: Creativity, Critical Thinking, Communication, Collaboration)
- Involving students in problem solving
- Enabling new ways of thinking and new ways of communicating and expressing ideas.
- Providing students with opportunities to reflect on their thinking in their personal or professional lives.

Introducing Scratch:

- Introducing the word algorithm. Participants will sit in small groups and do two activities. Then we will define an algorithm.
- Defining the word script, and the difference between a script and an algorithm.
- Discovering the software Scratch by introducing it briefly to the participants and the role of each icon or block.
- Participants can sit in pairs or individually and write scripts of some given e-version activities:
    1. Scenes
    2. Math problems

At the end of this workshop, participants should be familiar with some of the essential Scratch routines as walking, turning, talking, moving according to coordinates, drawing, creating variables, using loops, conditions and math operators….

- Participants will be given some written scripts and they should be able to identify and correct the errors.
- Participants will be given some written scripts (math problems) and they will have to know the purpose or the goal of the script without the use of Scratch.
- Participants can sit in pairs or individually and should be able to create games. (pong)

Conclusion:

The workshop concludes by:

- Discussing the possible curriculum that teachers should adopt in their schools and how to assess projects and exercises.
- Sharing with participants my experience in teaching coding in school and the way I introduce this course to my students.
- Answering questions.

References:

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- https://scratch.mit.edu/
- http://scratched.gse.harvard.edu/
- www.code.org

هيك ... أحلى (رياضيات)

اخلاص حمود و رندا فضل الله، ثانوية الكوثر، لبنان

المقدّمة: إن تعلّم الرياضيات في مرحلة مبكرة أمر هام ، والأهم منه معرفة الحاجة الملحّة لتعلمها وكيفيّة الاستفادة منها وتطبيقها حتّى تكون عونا .

- ويأتي السؤال ما هي أهمية الالعاب في الرياضيات ؟
- بعض الاجابات هي لتنمية مهارة التفكير لدى المتعلم ومهاراته الاساسية اضافة الى إثارة الدّافعية نحو التعلّم وزيادة التفاعل الصّفي من خلال العمل التعاوني الجماعي وما يشمله من جوّ تنافسي برئ بينهم والاهم معالجة صعوبات التّعلم عند الطلاب. واتخاذ موقف ايجابي من هذه المادة والابتعاد عن الاسلوب التلقيني ليألف الطالب هذه المادة .وتفصيلها أكثر وارد ضمن سياق انشطة الدورة.

المواضيع+الأنشطة	نوعه	المدة
تعارف .	جماعي	7د
1- التوقعات من الورشة .	فردي	10د
2- عصف ذهني حول الرياضيات أهميته في حياة المتعلم (شفهيا)	فردي \جماعي	10د
3- عرض على الجهاز العارض تغذية راجعة حول أهمية الرياضيات وربطها في حياة المتعلمين	جماعي	10د
4- عرض مشهدافيلم مصورعلى الجهاز العارض + مناقشة شفهية .	جماعي \فردي	10د
5- نشاط تفكرفي تجربة معلم + مناقشة شفهية .	فردي	10د
أبرز المهارات الرياضية التي يجب أن يمتلكها المتعلم في الرياضيات (إس . الجولة السريعة).	فردي \جماعي	5د
عرض على الجهاز العارض تغذية راجعة حول مهارات يمتلكها المعلم الفعال في الرياضيات.	جماعي	5د
عرض فيلم مصور قصة الصقر (لماذا التغيير ؟)	جماعي	5د
نشاط إحصائي حول أبرز الصعوبات التي يواجهها المتعلمين في الرياضيات (ملء إستمارة المفاهيم الرياضية)+عرض نتاج المج.+ مناقشة يليه عرض مهارات التفكير العليا والدنيا .	مجموعات	15د
تطبيق عملي حول الجمع +عرض المج + مناقشة +تغذية راجعة .	مجموعات	15د
عرض مراحل النمو المعرفي لدى المتعلمين (على الجهاز العارض)+ مناقشة أهمية الوسائل الحسية (للحلقة الأولى)	جماعي \فردي	5د
عصف ذهني حول أنواع الوسائل المستخدمة في الرياضيات+ عرض على الجهاز العارض + عرض لوسائل حسية متنوعة + كيفية إستخدامها (الألعاب التربوية).	مجموعات	10د
تطبيق مجموعات إبتكار لعبة تربوية + عرض + مناقشة الهدف منها وكيفية إستخدامها .	ثنائي	10د

سير الأنشطة :

- **تمهيد: يتم الترحيب وإلقاء التحية على المشاركين ثم يليها التعريف عن المدربتين (اخلاص حمود + رندا فضل الله).**
- **ن:1 نوعه : مجموعات \فردي مدة : 7د**
- **إس: عصف ذهني مهارة : التواصل \إستخراج المعلومات \العرض**
- **وسيلته : مكب الصوف**

- الهدف : التعرف بين أفراد الجلسة (الأساتذة المتدربين)
- كسر الجليد بين المشاركين وتعزيز التفاعل والتعاون بينهم .
- سيره : يدعو المنشط المشاركين الى الوقوف بشكل دائري ويطلب من كل فرد التفكر بمعلومة عن الرياضيات ويبدأ المنشط برمي مكب الصوف لاول مشترك ليقوم باعطاء معلومة ويدونها المنشط الآخر على ورقة كبيرة وهكذا لكل مشترك حتى يتم التوصل الى اكبر قدر من المعلومات حول الرياضيات مع الاشارة انه عند الانتهاء من اللعبة يكون قد شكل المشاركون شبكة عنكبوتية للدلالة على التعاون والمشاركة في تبادل الخبرات والمعلومات.
- ن2 تثبيت المعلومات عرض على الشاشة العارضة 5د
- سيره: يطلب المنشط من احد المشاركين بعد التعريف عن نفسه قراءة المعلومات ربطا بالنشاط الاول
- ما هي خصائص دراسة الرياضيات
- علم الرياضيات هو من أكثر العلوم المستخدمة فى حياة الإنسان بصورة شبه يومية، فهو متداخل فى شتى جوانب الحياة اليومية وتعاملات الناس، وقديماً توصل الإنسان إلى علم الرياضيات لتحديد إحتياجاته المختلفة ولمعرفة الوقت وتحديد الفصول وبعد ذلك لدراسة وتقييم الظواهر الطبيعية التى تحدث حوله ولتحديد بدقة الأوقات المثالية لزراعة المحاصيل الزراعية، وتقسيم مساحات الأرض وما إلى ذلك.
- تعرف دراسة الرياضيات بإنها دراسة الجبر والهندسة وتوظيف معادلاتها الرياضية والرسوم البيانية الرياضية فى خدمة علوم ودراسات أخرى مثل دراسات الفلك والفضاء، والدراسات التجارية، والقياسات الكمية وأيضاً توظيف حسابات المعادلات ن3
- الهندسية الرياضية فى علوم البناء والتشييد، لذلك فإن بعض علماء الرياضيات عرف الرياضيات بإنه علم القياس
- ن3 جماعي فردي مناقشة 5د اس : عمل فردي مهارة التنبؤ
- وسيلته : أوراق .
- الهدف : ذكر التوقعات من الدورة
- سيره: استنادا الى المعلومات في النشاط الاول وارتباطا بعنوان الدورة (هيك احلى) بماذا يوحي لكم هذا العنوان؟ اجابات حرة
- يتم عرضها شفهيا بعد اخذ الاجابات و تصويبها نحو هدف الدورة (التعلم عبر العب) تتم القراءة على الشاشة العارضة

- التعليم من خلال اللعب
- يُعتبر اللعب من أنجح الطرق في التعليم، خاصّةً للصفوف الصغيرة، ومن فوائد التعلّم باللعب بناء المهارات العاطفيّة الاجتماعية، وتعزيز التعلُّم الأكاديمي وربطه بالواقع المُحيط. وقد وجدت بعض الأبحاث والدراسات عام 2008 في جامعة شمال فلوريدا أنّ الأطفال الذين أمضوا ساعتين إلى ثلاث ساعات في تعلّم الرياضيّات، والقراءة، والكتابة، ومهارات اختبار معياريّة موحّدة، أو ما يُعرف بالأكاديمية المفرطة في التعليم واجهوا مشاكل دراسيّة في السنوات اللاحقة، ووفقاً للجمعيّة الوطنيّة لتعليم الأطفال الصغار NAEYC يُعتبر اللعب الحر من أنجح الطرق لربط عدّة مناطق من الدماغ في وقت واحد، مثل القدرات اللغويّة الشفهيّة، والقُدرات التأسيسيّة مثل: الذاكرة، والتنظيم، والمهارات الاجتماعية، كما أنّ اللعب الحر يُطلق العنان لغريزة الأطفال، ويجعلهم أكثر سعادةً.
- . التعليم ضمن مجموعات توجد فوائد عديدة لتطبيق طريقة التعليم ضمن مجموعات، وإقران الطلاب للعمل سوياً، حيث إنّها تُشجّع الطلاب على العمل الجماعي، وتُلهمهم لإيجاد الحلول، والأفكار المُبتكرة، وتُنمّي لديهم مهارات التواصل، كما يُساعد التعلّم في مجموعات على تحديد المجالات التي يُمكن أن يُبدع فيها الطفل، وتلك التي يحتاج

لتطويرها، ويجب أن تكون هناك مُناقشة بعد عمل المجموعات للتحدّث أكثر عن التصوراته والنتائج، والطرق التي تم اتباعها في تنفيذ المهمات المطلوبة.

- استخدام الأشياء المادية
- يستطيع المعلم تخطيط العديد من الأنشطة لتعلم المفاهيم الأساسية للأرقام والأشكال، ويكون ذلك باستخدام المكعبات، أو البلاط الملون، ولتعلم الجمع يمكن وضع العناصر أو الأشكال معاً ومن ثم إبعاد بعض منها لتعلم الطرح، ويجب التأكد من أن الطلاب يمكنهم التعرف على الأشكال الهندسية المختلفة.
- الرسم والغناء حيث يعتبر الرسم والغناء من أكثر الوسائل التعليمية التي تبني خيال الطفل، وقدرته على تعلم الألوان والأشكال بالإضافة إلى تحسين مهاراتهم في الحركة، حيث تساعدهم العمليات الإبداعية مثل الرسم والغناء على التعبير عن تجاربهم ومشاعرهم

ن:4 نوعه جماعي مدة :10د

- **اس : التعلم عبر اللعب مهارة : استخراج المعلومات + الربط**
- **وسيلته الحاسوب + الجهاز العارض + كرة**
- **الهدف : أن يتعرف إلى أهمية الرياضيات وربطها مع حياة المتعلم .**

- **سيره : يتم إجراء مناقشة شفهية مع المتدربين مكن خلال عرض السؤال عبر الشاشة العارضة عن ماهية الرياضيات وأهميتها وربطها في حياة المتعلمين حيث يتم رمي الكرة فيلتقطها المشارك ثم يجيب عن السؤال مع المناقشة بين الجميع ثم يتم عرض عبر الشاشة العارضة (مقدمة تشرح ماهية الرياضيات وكيفية ربطه والإستفادة منه في حياة المتعلمين) .مع تقديم التغذية الراجعة .**

- الألعاب التعليمية
- تعتبر الألعاب التعليمية من أهم الوسائل التعليمية، لأنها تشجع الأطفال على تطوير مهاراتهم الأساسية مثل الإبداع والتفكير وغيرها، ولهذا من المهم أن نزودهم بالألعاب التي تسمح لهم بالتعلم أثناء اللعب
- ومن أهم فوائد الألعاب التعليمية:
- الابتكار والإبداع: الألعاب التعليمية تمكن الأطفال من تطوير الإدراك والحس لديهم.
- ـ المهارات المعرفية: تساعد الألعاب التعليمية الأطفال على تطوير آليات التفكير، ومن أهم الألعاب التي تساعد على تعزيز المهارات المعرفية تلك التي تتضمن الألغاز.
- ـ المهارات الحركية: فالألعاب التعليمية المناسبة تساعد الأطفال على تطوير مهاراتهم الحركية بالتزامن مع مهاراتهم المعرفية.

لا يتعامل المعلم مع طلابه كمسؤول بل يندمج معهم ويقوم بالتفاعل مثلهم، وهذا الأسلوب يمنح الطلاب العديد من المعارف، ويندمجون فيه مع بعضهم البعض، ويقومون بالعديد من النشاطات التي تعزز مهارة الاستكشاف والوصول إلى الإجابات بالبحث.

أنواع الوسائل التعليميّة:

- هناك ثلاث انواع رئيسية للوسائل التعليمية وهي:
- النوع الأول: الذي يكون فيه التعليم بواسطة الملاحظات والمشاهدات. النوع الثاني: ويكون فيه التعليم بواسطة الممارسة والأنشطة المتنوّعة. النوع الثالث: الذي يتم فيه التعليم عن طريق المواد المجرّدة والتحليل العقلي

- **ن:5 نوعه فردي جماعي مدة : 15د**
- **اس : التفكر والتأمل مهارة : إستخراج المعلومات +التفاعل .**
- **وسيلته : المشاركين + سؤال**

- **الهدف : التفكر في تجربة أداء معلم .**
- **يطرح المنشط السؤال التالي:**
- **اختر هدفا معينا في مادة الرياضيات واذكر كيفية تنفيذه ؟ يليه عرض لطرق تعليم.**
- **هدفه التفكر في مشكلات تواجه المعلمين خلال العملية التعليمية .**
- **سيره : يتم إجراء حوارقصير بين المدربتين من خلال طرح السؤال الآتي : "هل سبق وشعرت بالاحباط بعد تجربة مررت بها مع تلاميذك بعد تقديم مفهوم في الرياضيات ؟ وهنا يتم الحوار بين المدربتين حول تجربة ما خلال العملية التعليمية ليتم بعدها طرح السؤال على المشاركين بعد اختيارهم الهدف التعليمي حول تجربة واجهت كل منهم تتم الإجابة على ورقة صغيرة توزع على كل منهم ثم يتم جمع الإجابات في صندوق لتعرض عشوائيا من قبل بعضهم البعض دون معرفة صاحب التجربة عندها تتم مناقشة التجارب مع المشاركين لتصويب النقاش حول أهداف الدورة والحاجة إلى معرفة المزيد من المهارات والطرائق .**

- **يجب أن يبتكر المعلّم طرقاً جديدة وسهلة لتدريس الطلاب وخاصّة في المراحل الابتدائيّة، ويجب أن يقدّم المعلومات بطرق مبسّطة حتّى يسهل على الطّلاب استيعابها وفهمها وتحصيل النتائج العلميّة والدراسيّة المطلوبة، والتمكّن من كافّة المحتويات في الكتاب المقرر، وما يلي بعض الطرق لتدريس الرياضيات للصّف الأول الابتدائي**
- **- شرح الغاية المطلوبة من الدّرس قبل البدء في تدريسه، وربطه بالحياة العمليّة ليتمكّن الطالب من إدراك أهميته، وإعطاء أمثلة عمليّة يقوم بها الأطفال بشكل يومي؛ حتّى يتم توثيق وترسيخ المعلومات في عقل الطالب.**
- **- استخدام طرق محفّزة ومشجّعة للأطفال، فالأطفال يميلون إلى الملل من الأشياء بسرعة كبيرة، فيجب ابتكار طرق تحفّز تركيز واستيعاب الطفل وتجلب انتباهه**
- **وما يلي بعض هذه الطرق:**
- **تعليق لوحات داخل غرفة الصّف تحتوي على الأرقام وجداول الضرب ومعادلات رياضيّة بسيطة مرسومة بطريقة جذّابة وباستخدام ألوان جميلة وزاهية؛ لجذب انتباه واهتمام الأطفال.**
- **شرح الدّرس باستخدام اللوحات الجذّابة ومميّزة.**
- **استخدام أدوات دراسيّة جذّابة، كاستخدام أقلام ودفاتر ملوّنة وأقلام زاهية وجميلة لشرح الدرس على السبّورة.**
- **شرح الدّرس باستخدام إحدى التقنيات الحديثة، كوسيلة الشرح المحوسب باستخدام تقنيات العرض الحديثة، كحوسبة الدّرس على برامج الحاسوب المعروفة وعرضها على الطلاب.**
- **تقديم المكافآت للطلاب المتفوقين لتحفيّز المنافسة الشريفة بين الطلاب، وتحفيز الطفل للدراسة والاجتهاد للحصول على المكافأة المخصّصة للأطفال المجتهدين، وتحقق هذه الطريقة العديد من النتائج الإيجابية في جميع الحقول التعليميّة ومختلف الأعمار**

- **ن:6 جماعي مدة :10د**
- **اس : مشاهدة فيلم + المناقشة مهارة التحليل + الربط**
- **وسيلته : الحاسوب + الجهاز العارض**
- **الهدف : ربط نتاج المتعلم بمهارات المعلم .**
- **سيره يتم عرض فيلم مصور حول صفين بنفس المرحلة والمضمون أن تلامذة صف (أ) وصف (ب) يتعلمون في نفس المدرسة ويخضعون لنفس المنهاج و يطبقون في نفس الكتب ونفس عدد الحصص التعليمية ولكن من قبل**

معلمين مختلفين . بعد خضوعهم للإمتحانات الفصلية جاءت النتائج مغايرة تماما وبعيدة من حيث نسبة النجاح والمعدل الوسطي في الرياضيات فكانت نتائج صف (أ) موفقة بنسبة نجاح مئة في المئة ومعدل وسطي 86في المئة أما صف (ب) فكانت نسبة النجاح غير محققة 60في المئة والمعدل الوسطي 34في المئة .

- بعد مشاهدة الفيلم يتم طرح الإشكالية ومناقشة المتدربين للوصول إلى الأسباب بأنها تعود إلى المعلمين وأسلوبهم ...
- ن:7 نوعه: مجموعات مدة : 15د
- اس : العصف الذهني مهارة : استخراج المعلومات \الربط \العرض
- وسيلته :لوحات كرتونية +أقلام .
- الهدف : ذكر المهارات التي يمتلكها معلم الرياضيات .
- سيره : ربطا مع النشاط السابق وإنطلاقا من الحاجة إلى معلم يمتلك مهارات تفكير تمكنه من تعليم وتقديم مفاهيم الرياضيات بمرونة ونجاح يتم توزيع لوحات كرتونية على المجموعات ليدونوا عليها عبرالعصف الذهني حول مهارات المعلم الفعال في الرياضيات ثم يتم عرضها من قبل اعضاء المجموعات وتتم المناقشة خلال العرض وتقديم التغذية الراجعة عبر الجهاز العارض عن مهارات يمتلكها المعلم الفعال في الرياضيات .
- ن8:نوعه جماعي فردي مدة 5د
- إس : مشاهدة فيلم تأمل مهارة : تحليل + ربط
- وسيلته : فيلم مصور
- الهدف : التعرف إلى أهمية الصبر والمثابرة والتصميم على التغيير نحو الافضل .
- سيره يتم عرض قصة الصقر المصورة ويتم تأملها من قبل المشاركين ثم تؤخذ المداخلات \الإنطباعات حولها وتناقش(ثلاثة على الأكثر)
- ن:9 نوعه جماعي مدة : 7د
- اس : المناقشة مهارة: الربط + استخراج المعلومات
- وسيلته : الجهاز العارض + الحاسوب
- الهدف : أن يتعرف إلى مراحل النمو المعرفي عند المتعلمين .
- سيره : يتم الربط مع الأنشطة السابقة للوقوف عند مراحل النمو المعرفي عند المتعلم وأهمية توظيف الوسائل الحسية في العملية التعليمية (الحلقة الأولى) وهذه المرحلة هي المرحلة الحسية أو التعلم عبر الحواس بعد المناقشة مع المتدربين يتم عرض عبر الحاسوب لمراحل النمو المعرفي . يليه تطبيق انشطة يستفاد منها دائما وتعتبر كرزنامة للمشاركين
- ن10:نوعه جماعي فردي تطبقي مدة 20د استراتيجيات مختلفة
- -لعبة كرة السلة
- تهدف هذه اللعبة إلى تركيب معادلات.

- يعطى كل طالب كيسا من الكرات مكتوب عليها رقم واحد.
- يرمي كل لاعب عددا من الكرات من مكان قريب والكرة التي تدخل السلة توضع جانبا.
- بعد الانتهاء من رمي الكرات يقوم الطالب بتكوين أكبر عدد من المعادلات التي يمكن أن تتكون
- من الارقام.
- يمكن استخدام نفس الكرات ، بحيث يقوم الطالب
- بترتيبها تصاعديا وتنازليا
- . الفرح والحزن
- الأدوات:
- قناعان يمثلان وجه حزين وقناعان يمثلان وجه فرح.
- اللاعبون:
- طالبان كل طالب يحمل في يده قناع فرح + حزن.
- طريقة اللعب:
- تسرد المعلمة مواقف سارة ، واخرى غير سارة ، وعلى الطالب الذي يسمع الموقف السار أن يرفع قناع
- الفرح ، وإذا سمع موقف غير سار أن يرفع باليد الأخرى قناع الحزن ، ومن يخطأ يخسر من أول مرة
- .ونكمل مع طالب آخر.
- المواقف التي ممكن أن تسرد:
- 1 -خرج ارنوب إلى الشارع ولم يعبر من خطوط المشاة فدهسته السيارة المسرعة) . حزين(
- - 2نجح أخي الصغير فأعطاه والدي هدية) . فرح(
- - 3تفوقت في دراستي فكافأتني المعلمة) . فرح(
- - 4لم اتناول فطوري هذا اليوم فأصبت بتعب وإغماء) .حزن(
- - 5جاء عيد الأم فأهديت لأمي هدية) . فرح(
- - 6لم يلبس جاري ملابس العيد لأنه فقير ولايملك النقود).حزن(
- - 7ساعدتُ جاري الفقير وسعد كثيرا بمساعدتي له) فرح. (
- ٤ – لعبة نرد الأعداد والكور
- **الأدوات:
- 1 -علبة كارتون مربعة الشكل.
- 2 -ورق أبيض للتغليف.
- 3 -ورق اسود.
- 4 -صمغ
- 6 -كور ملونة في سلة كبيرة.
- **الطريقة:
- 1 -نقوم بتغليف العلبة الكارتونية بالورق الأبيض.
- 2 -نرسم دوائر النرد في اللون الأسود بعدد أرقام النرد يعني ١ دائرة ،، ٢ دائرتين ،، ٣/ دوائر ،، ٤
- دوائر ،، ٥دوائر ،، و ٦ دوائر.
- 4 -تلصق الوائر على الجهات الستى للعلبة بنفس ترتيب الأعداد السابقة.
- 5 -تجمع الكور الملونة في سلة كبيرة استعدادا للعب.

- **الطريقة:
- 1 -يرمي الطالب النرد) الزهر (على الأرض ليثبت على رقم معين.
- 2 -يتعرف الطالب على الرقم المطلوب ، ويستخرج من السلة نفس العدد من الكور.
- مثال : رقم النرد هو ٤ <<<< إذن لابد أن نجمع اربعة كور.
- 3 -نستطيع أن نصنع أكثر من مكعب نرد ، ونقسم الأطفال إلى مجموعات وعليهم التسابق في النقاط الصحيحة من الإجابات
- لعبة مطابقة اللون + غلق الأزرار
- * .الأدوات:
- ٦٠. 1 - × قطعة صغيرة من قماش الجوخ من أي لون بقياس ٤٠
- 2 -قطع صغير مختلفة الألوان من قماش الجوخ.
- - 3أزرار ملابس.
- 4 -خيط وإبرة.
- **طريقة العمل:
- 1 -ترسم مجموعة من الأزهار مختلفة الألوان على قماش الجوخ.
- 2 -ترسم حلقات دوائر من نفس ألوان الأزهار.
- 3 -يقص شكل مزهرية وتلصق على القطعة الكبيرة الأساسية.
- 4 –يعمل شكل أغصان من قماش الجوخ تخرج من المزهرية.
- 5 -تلصق دوائر الحلقات حول المزهرية.
- 6 -يثبت كل زر داخل وسط الدائرة بالخيط والإبرة.
- 8 -يعمل شق صغير في وسط كل زهرة بحجم الزر تقريب□ا.
-) - 9ساعة توقيت (الخاصة بالرياضة
- **طريقة اللعب:
- 1 -تجمع كل الأزهار على الطاولة.
- 2 -يوضع قماش القاعدة الأساسي للمزهرية أمام الطالب.
- 3 -يبدأ التوقيت الزمنى للطالب بحيث يقوم بتركيب جميع الأزهار في الأزرار ، مع ضرورة مطابقة لون
- الزهرة مع لون حلق الدائرة.
-
- لعبة من يسمع رقمه يقفز
- وهي عبارة عن بطاقة أرقام كبيرة ، كل طالب يمسك رقم ،ويمكن ان نعطي الطالب الرقم ألذي
- يخطئ به ، و يمسكه بيده وكل الأطفال يصطفون في خط أفقي واحد حاملين أرقام ، وعليك أن تنادي بالرقم ، وألذي يسمع رقمه منهم ل ينط للأمام رافع رقمه للأعلى ، وألذي يخطأ يرجع مكانه.
- لعبة مطوية الأرقام:
- مضمونها نفس طريقة اللعبة السابقة : وهي عبارة عن أرقام كبيرة مكتوبة في بطاقات ، تلصقين
- البطاقات كلها جنب بعضها البعض في خط عمودي ، من الأسفل إلى الأعلى ، يعني البدء من تحت
- بالرقم واحد ، إلى آخر رقم تحبينه وليكون ١٠ فوق بالأعلى ، قبل الرقم واحد تحت
- دائرة في بطاقات تكون نقطة البدية ألتي يقف عليها الطفل ، كل البطاقات تكون
- ملصوقة مع بعضها البعض، عشان تقدرين تطوينها بعد الأستخدام مثل المطوية بس بشكل عمودي.
- طريقة اللعبة : تخلين الطفل يوقف في دائرة البداية ، عند سماعه للرقم المطلوب ، ينط على الرقم ، او

- ممكن اللعب بطريقة أخرى ، حضري بطاقات لمدلولات الأرقام من الكميات ، يعمي باقة الرقم ٢ ، جهزي
- بطاقة ثانية لرسم يحتوي شيئين مثل وردتين ، ارفعي مدلول الرقم من الرسم أمام نظر الطفل ن وخليه
- يتعرف على الرقم وينط عليه ، يعني يوقف فوقه .هاللعبة تعلم الطفل أيض ترتيب وتسلسل الأعداد بشكل
- صحيح.
- الملك و الحراس
- الهدف : مكونات العدد
- وقت التنفيذ : ٥ دقائق
- عدد المشاركين : ٣ ملوك اعضاء كل مجموعة *حارسين من كل مجموعة
- الفئة المستهدفة : طلاب الصف الأول الابتدائي
- الوسائل التعليمية : تاج) عدد ٣ * (بطاقات ارقام
- طريقة التنفيذ : يصنع المعلم تاج للملك) عدد ٣ (، و يضع التاج على رأس الطلاب الثلاثة الأول على كل تاج حاصل اجمع وفي 1د عليهم ايجاد مكونات المجموع
- ٥١ – أزرق ، أبيض ، أحمر
- الأهداف التربوية : تنمية عضلات الجسم ، التآزر الحركي – البصري ، تمييز الألوان ، دقة الملاحظة.
- مواد اللعبة : ثلاث لوحات من الكرتون باللون الأزرق ، الأبيض ، الأحمر.
- سير اللعبة
- يوزع المعلم الأطفال الى ثلاث مجموعات ، ويقف كل مجموعة الى جانب المجموعة الأخرى ، ويخصص
- المعلم لونا لكل مجموعة ، عندما تقول المعلمة معادلة (5+10) رفع اصاحب اللون امناب
- -أشجار البستان
- الأهداف التربوية : التعرف الى أشجار البستان وتذكر الأعداد.
- المكان :الحديقة.
- ٩، كيس هدايا – . مواد اللعبة :أوراق مرقمة من ١
- سير اللعبة
- تجلس المعلمة مع الأطفال في الحديقة وتروي لهم قصة سنجاب ذكي يعرف الفصول الأربعة وأرد أن
- يخزن مؤونة الشتاء في أحد تجاويف الأشجار بعد عمله الجاد في فصل الصيف ، وحين العمل وجد كيسا
- مملوءا بالهدايا ، فكر السنجاب الذكي أن يعطي الهدايا أرقاما ويضع كل رقم تحت شجرة محددة ، تطلب
- المعلمة من الأطفال البحث عن الأرقام حين تذكر اسم الشجرة ، ثم يبحثوا في النهاية عن كيس الهدايا ،
- مثل الرقم) ١ (تحت شجرة التفاح ، العدد) ٢ (تحت شجرة البرتقال... ، حين الإنتهاء من البحث عن
- الأرقام تحت الأشجار) التي سبق للمعلمة ذكرها ، تطلب المعلمة من الأطفال البحث عن كيس الهدايا
- المخبأ تحت إحدى الأشجار ، وحين اكتشافه توزع الهدايا على الأطفال.
- أنماط العدد
- الغرض
- بنهاية الدرس، يستوعب الأطفال فكرة الأعداد الأساسية ويفهمون أن تلك الأعداد يمكن
- تمثيلها بطرق مختلفة . تحديدا سيتعلم الأطفال الفئات، ويصبحون قادرين على ممارسة
- كتابة الأعداد
- هذا الدرس يجب أن يكون أولا شفهيا، ثم يعاد كتابةً

- **طريقة التدريس والأنشطة**
- **يشترك الفصل كاملا**
- **1.اختبر قدرة الأطفال على العد من ١ إلى ٢٥ باللغة المستخدمة**
- **يجب أن يتدرب التلاميذ على العد من ١ إلى ٢٥ مرتين أو ثلاث مرات**
- **: .2يقف جميع التلاميذ في الفصل، اسألهم أسئلة أساسية واطلب منهم الإجابة شفهيا**
- **كم أيد لديك؟**
- **كم عدد أصابعك؟**
- **كم عدد الأصابع في اليد الواحدة؟**
- **تأكد أن أيا من التلاميذ لم يبق صامتا**
- **3.الآن تطرح الأسئلة والتلاميذ يجيبون بإظهار الشيء بدلا من الكلام**
- **اظهر لي شيئا لديك منه أثنين**
- **اظهر لي شيئا لديك منه واحد فقط**
- **اظهر لي شيئا لديك منه خمسة**
- **اسأل الأطفال كم عدد الآذان لدى الإنسان .بعد أن يوافق كل منهم على أن كل إنسان**
- **لديه أذنين، اصطحبهم واحد بعد الآخر إلى مساحة فضاء خاصة لممارسة الدروس.**
- **وأثناء انتقالهم أسألهم ما هو حاصل جمع آذانهم**
- ***4.***
- **إذا كانوا يعرفون كيف يقرءون ويكتبون الأعداد على السبورة، اكتب كما يلي**
- **شخص ٥ ٤ ٣ ٢ ١ الخ**
- **آذان ١٠ ٨ ٦ ٤ ٢ الخ**
- **كرر هذا النمط مع شيء يتكون من خمسة وحدات في كل مجموعة، ثم من عشرة**
- **وحدات، وهكذا كرر أنماطا مختلفة**
- **5.أعط التلاميذ راحة لفترة قصيرة**
- **: .6الآن اسأل التلاميذ الأسئلة التالية**
- **كيف يمكن أن أحصل على ستة عيون؟**
- **كيف يمكن أن أحصل على ٢٥ إصبع؟**
- **: .7هناك نماذج من الأسئلة أكثر صعوبة مثل**
- **كيف يمكن أن أحصل على سبعة عيون؟**
- **كيف يمكن أن أحصل على تسعة أيادي؟**
- **بعد أن يستوعب التلاميذ فكرة الدرس ويحرزون تقدما، اسألهم كيف يمكنهم تكوين**
- **العدد بأساليب مختلفة، وكم عدد الأساليب التي يمكن التفكير به، وهذه بعض الأمثلة**
- **.8**
- **يمكن الحصول على سبعة عيون عن طريق سبعة أشخاص كل منهم يخفي عينا من**
- **عيونه ويظهر الأخرى، أو عن طريق أربعة أشخاص، ثلاثة منهم يظهرون عينيهما**
- **الاثنين والرابع يخفي إحدى عيونه**
- **-**
- **يمكن الحصول على ثماني أصابع عن طريق أربعة أشخاص كل منهم يظهر**
- **اصبعين**
- **الوحش الوسيم**

- **المستوى :من الروضة وحتى الصف الثالث الاساسي.**
- **الهدف :التعرف على أجزاء الجسم، تنمية مهارة الكتابة**
- **المهارات :القراءة والكتابة.**
- **اللعبة :تحضر المعلمة علبتين كبيرتين من ورق الكرتون على ان تكون كل علبة ذات ستة أوجه .تكتب**
- **على العلبة الأولي أجزاء الجسم على جزء على وجه) يد، رجل، عين، أنف، أسنان، وجه .(ثم تكتب على**
- **العلبة الثانية أرقام (٧ ،٦ ،٥ ،٤ ،٣ ،٢ مثلاً .تطلب من مجموعة من الطلاب الوقوف على السبورة**
- **للرسم و تطلب من بقية الطلاب إخراج ورقة للرسم عليها .تبدأ اللعبة باختيار طالب لرمي الكرتون الأول**
- **وآخر لرمي الكرتون الثاني فيعرف الطلاب أنهم سيرسمون مثلا عيون الوحش وعددها ثلاثة .ويستمر**
- **رمي العلب حتى ينتهي شكل الوحش .المرات المكرر لجزء الجسم لا تحسب وعلى الطالب إعادة الرمي**
- **حتى ينتهي جسم الوحش .بعد ذلك سيحصل الطلاب جميعا على وحش ظريف بثلاثة أعين وأربعة أنوف**
- **ويدين وسبعة أرجل مثلا .(يعود جميع الطلاب لمقاعدهم ويكتبوا قصة عن الوحش أين يسكن وما اسمه**
- **وماذا يأكل وماذا يحب.**
- **ن:11 نوةعه ثنائي مدة 10د**
- **اس : التطبيق مهارة : الإبتكار**
- **وسيلته : : أغراض متنوعة : شرائط اكرتون أعداد \ أقلام امقصات الاصق ادمى اورود احلوى اخيطان أزرار العب تركيبية ....**
- **الهدف : أن يبتكر لعبة تربوية رياضيات.**
- **أن يذكر الهدف من توظيف اللعبة التربوية .**

سيره : يتم الربط والتطبيق على النشاط السابق حيث يتم تحفيز المتدربين لإنتاج ألعاب تربوية رياضيات من خلال توزيع الوسائل المتنوعة على الثنائيات ليتم إبتكار الالعاب التربوية التي يوظفونها في العملية التعليمية وتحفز تلاميذهم على التفاعل والإنتاج ...وعند الإنهاء تعرض الألعاب التربوية وتقدم التغذية الراجعة حول الهدف من كل لعبة وطريقة الإستخدام لتوظيفها بالشكل والطريقة الفعالة .

Sciences through Minecraft and Micro: Bit

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Technology these days are part of our daily life, denying this fact keeps us from providing different opportunities for students. The 21st century skills; all k-12 students should acquire, is in tandem with technology. All of this could be achieved if we use technology in classroom in proper way. This session aim is at introducing different technologies (Minecraft MEE and Micro:Bit) as an aiding tools to help delivering different Sciences and Mathematics concepts that teachers can use it in their classroom.

Engaging students throughout the day sometimes could be challenging, however since the main reason of using technology in education is to aid the learning teaching process, MEE and Microbit provided engaging solutions for students to see how these subjects are essential in our daily life and how subject are linked. Thus these technologies provide experimental safe environment allowing them to construct their own understanding on the project. Minecraft was initially a number one game that most of the students used to play after school time. Last year, they introduced the chemistry lab where teacher can decide whether the session is delivered as individual or a as a whole classroom involvement. While Micro:Bit is a tiny programmable computer, designed to make learning and teaching easy and fun. The application of these examples can be used in primary classes through university level as they can be used through different concepts/units.

Introduction:

- What is a better way of teaching Sciences and mathematic than having a safe environment for experimentation and exploration? This session is dedicated to show Minecraft (MEE) and its update – Chemistry Lab and Microbit.
- This session aims at introducing different technologies (Minecraft MEE and Micro:Bit) as an aiding tools to help delivering different Sciences and Mathematics concepts that teachers can use in their classroom.

- Since we have different intelligences, this technology tool plays a major role in engaging different learners and allow them to learn by constructing their own knowledge.
- The framework follows the constructivism approach; it allows learners to construct their own knowledge based on what they know and based on their previous experiences - learn by playing.
- The best part is that there is a whole community there to help teachers around the world by facilitating the teaching experiences through technical support, lesson plan or sharing personal experiences. On the other hand, there are ready lesson plans to help teachers start with. Finally, knowledge can always be gained if the students have the skills; since it is the age of skills according to the ISTE standards.

- 2. **Strategy:**
- The session will be mainly hands on where teachers put their students hat and start creating and sharing ideas of the assigned tasks and will have a sometime to experiment their own projects.

- 3. **Description of session:**

- The session will start with brief introduction about common technology around us and their integration in classrooms. Then introduction about the (MEE and Micro:Bit) and its positive influential within the students' community.
- Then the hands on session starts. Different topic related to both Mathematics and Sciences concepts are going to be tackled through different projects.
-
- **Activity One:** How to use MEE
- Objective: Identify the keys to MEE.
- Activity flow: The part is to show teachers how to access MEE and give them the main keys to walk around in MEE. This activity will mainly be focused on the briefing teachers on how to use the game. An example of two will be covered through this introduction (Mathematic reinforcement activity)
- **Activity Two:** Sciences and MEE
- Objective: Discover different examples of how to use MEE in science
- Activity flow: Different examples are going to be demonstrated, readymade that teachers can explain a lesson or kick their session with. The teachers will be able to see how simple tools and blocks can create a complex examples and different units.
- **Activity Three:** Chemistry lab
- Objective: Experiment with the chemistry lab.
- Activity flow: Introduce the chemistry lab, the aim of having this virtual lab is not only to create different reactions in safe environment but also to make learning interesting and engaging, where students can experiment and build their chemistry passion in the lab with their friends. This activity will show teachers how to create reactions in a virtual lab and how they can use it in their classes.
- **Activity four:** Examples of lesson plan
- Objective: Create a lesson plan
- Activity flow: After showing the flow of the MEE lessons, teachers will be given sometime to jot down some ideas for potential lessons that they can use MEE in different subjects and grade levels. This time the attendee teachers are given the time to share their ideas and build upon other insights and interaction.
- **Activity five:** Micro:Bit introduction
- Objective: To know how things works in Micro:Bit and its characteristics.
- Activity flow: Small activity to set the teachers into Micro:Bit and show its potential. This activity will introduce the different parts of Micro:Bit. Through the designed example the teachers will realize that this tool is not only about coding but also it is in the science and math integration subjects, where students are given the power to ignite and take their units further.
- **Activity Six:** Acceleration application in Micro:Bit.
- Objective: Demonstrate how acceleration concept can be applied in a classroom setting.
- Activity flow: Unleash acceleration in interactive workshop, some uses video to introduce acceleration, others uses real example from their daily life however this gives

the students to use differnet learning skills (doing, thinking, Coding and experimenting) in less than 30 min activity in one classroom.

- **Activity Seven:** Lesson plan time.
- Objective: Drafting their lesson plan.
- Activity flow: After being exposed to both technologies, the teachers are given the time to collaborate together to work on their lesson plan using the unit they feel suitable to start with.
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- Moreover, the session will tackle the main teacher limitation - Time. When it comes to technology some teachers oppose the idea since they barely have time to finish the curriculum, however this session will show the teachers that a session in Minecraft or Micro:Bit can introduce and reinforce different concepts and make sure the students get the ideas since they are actually doing it instead of imagining how it could be. Through the presented examples, teacher doesn't really need to know everything about these technologies, but the lesson objectives and some of how to solve an issue that rotates around the subject; the aim is to help teachers rather overwhelm them.

4. **Conclusion:**

- Technology is something every school is pushing for, but applying technology in proper way is life saving for both teacher and students. This session will show teachers how technology can help subject classes in authentic experimentations that shows how subjects are related to our day to day life.
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- 5. **References:**
- Minecraft in Education Website
- Micro:Bit Website
- ISTE Standards
- Constructivism Theory.

Action Verbs; Route to Critical Thinking!

Zeina Merhi, Universal College of Aley, Lebanon

This workshop sheds the light on the most frequently used action verbs, their meaning, and interpretation according to the Lebanese Curriculum in correlation with Bloom's taxonomy .The primary purpose of this workshop is to equip science teachers of all cycles with the knowledge and skills needed to promote the students' critical thinking via well-planned strategies and well-designed problem solving exercises. Participants will take the role of a "learner" by participating in hands-on activities, practicing the action verbs, and designing exercises that target high cognitive levels. Hence, they will become aware of the importance and usefulness of action verbs which can be immediately used in their classrooms to enhance students' engagement and promote their critical thinking.

Introduction:

In an effort to provide the best learning experience for their students, educators strive to meet the principles of good practice during explanation and assessment. Here comes the role of action verbs, despite being an issue of controversy among teachers, science coordinators and students; as one of the fundamental routes to critical thinking and active learning.

This workshop is recommended for all science teachers of all cycles who will receive 4 handouts. It will bridge the gap between cycles by providing the skills of action that can be immediately used in the classrooms to enhance students' engagement and promote their critical thinking.

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Strategy:

1. Brain Storming will be used in part 1.
2. Cooperative group work will be used in parts 2 and 3
3. Stand up, hand up share up (or think pair share) will be used in part 4

Description:

Part 1: Critical Thinking and Action verb.

Duration: 20 min

The brain storming strategy will be adopted in this part where the participants will be asked to choose a word or a phrase that is linked to or is evidence of critical thinking. Then a discussion will be held concerning critical thinking and action verbs will be introduced as one essential way to promote critical thinking

This part will also include a brief lecture about the action verbs as declared by the ministry of Education. The three domains entitled; domain A- mastering acquired knowledge, domain B- practicing scientific reasoning, and domain D -mastering communication techniques will be over-viewed along with their competencies. Bloom's Taxonomy will be highlighted as well, showing the interaction between action verbs and Bloom's Taxonomy. The participants will receive the first handout that summaries Bloom's Taxonomy, the three domains and the 20 action verbs.

Part 2: Let's up the verbs into Action.

Duration: 35 min

The participants will be divided according to the cycles they teach into 3 groups; group of cycle 4 science teachers, group of cycle 3 science teachers, and a group including science teachers of cycle 1 and 2. Participants will be given a second handout. The handout includes 4 sample exercises each suitable for one of the learning cycle. Note that the group of teachers of cycle 1 and 2 will have 2 sample exercises where they can choose one. For each sample exercise there will be a range of 4 to 6 answers and the participants will have the task of choosing the appropriate action verb(s) as a question for each of the following answers.

Each group will be given 10 min to agree on the suitable action verbs. Then members of all groups will participate in the discussion.

Participants will be able to:

- Practice action verbs correctly.
- Value the importance of question choice while preparing a test or any assessment.
- Work effectively in groups.

Part 3: Your Call into Action

Duration: 35 min

Participants are still divided into groups as mentioned previously. They will receive a third handout that includes 3 sample figures appropriate to each learning cycle. The participants are asked to work in groups and design an exercise based on the given figures within duration of 10min.

Participants will be able to:

- Create exercises based on problem solving strategies.
- Target higher cognitive levels of thinking among students.
- Practice the art of guided questioning to unleash the critical thinking of their students.
- Value the importance of action verbs in promoting action verbs.
- Work effectively in groups.

Part 4: Stand up! Hand up! Share up!

Duration: 30 min

This activity will take the participants away from their comfort zone. They will not be grouped with people of same cycle and will not be given sample that take into consideration the cycle they teach. The participants will find randomly a partner via "stand up, hand up, share up". They will all receive the same fourth handout that consist of 3figures addressing the same scientific concept but each from a different perspective. Given 10 min, participants will be asked to design an exercise respecting the correct using of action verbs and problem based inquiry.

Participants will be better critical thinkers who will design assessment that target higher cognitive levels and help their students acquire the skills to become critical thinkers.

Semiotic Modalities in Teaching: Going Beyond the Norm

Hanadi Hammoud, Saint Georges Schools, Hadath – Lebanon.

Semiotic modalities in teaching are methods that can be used to explain certain concepts generally, and in biology classes, such methods can be utilized as an innovative way to deliver the material. This session will present examples of these teaching methodologies that can be applied in multilingual classes, including the use of gesticulation, the implementation of the language of art, the method of drawing a path and the utilization of technology in teaching biology. During this session, the presenter will share these methodologies based on experience of employing them in intermediate and secondary classes, and some hands-on activities that can be used in these classes will be simulated. This will allow the attendees to apply certain activities while explaining, and to transform their classes from a passive environment, from the perspective of students, into an active and interesting one, thus going beyond the norm.

Science classrooms are the place where students' views of the world are formed. These views are usually built within the boundaries of the classroom, and such boundaries are typically defined by the teacher's creativity and ability to explain concepts. In multilingual classes, where the language used might not be the native language for the students, a need to go beyond linguistics arises, which encourages us as teachers to think of advanced teaching methodologies that allow our students to easily grasp the scientific concepts, and helps avoid misconceptions. Teaching biology cannot be limited to the use of words only, it is rather a synergetic integration of the usage of words, art, gestures, maps, graphs, charts, tables, diagrams and much more. These semiotic modalities must be implemented while explaining scientific concepts to both intermediate and secondary classes. Using such modalities allows a better understanding of the material explained, an enhanced organization of the concepts and their interrelations, and offers access to a wider spatial measure of the concepts. It is essential that students understand the concepts deeply, so that they can express their understanding of the subject in different ways, such that linguistics become not much of a concern to them.

The participants in this session will be introduced to some teaching strategies that can be applied while explaining the many critical concepts of biology. A combination of teaching techniques and activities to enhance the learning methodologies of the multilingual classes. The teaching strategies and techniques can ensure a comprehensive explanation of the scientific principles, and allow to tackle them from a variety of perspectives. They can also improve the in-depth understanding of the material and help emphasize the ideas in a clear and organized way. These teaching strategies will be presented through a powerpoint presentation (30 minutes), and include:

a. Use of gesticulation: a gesture is a presentation of a non-verbal communication method that utilizes the body language, facial expressions and social conventions. The implementation of gestures while explaining in a multilingual classroom is considered a psychological path that facilitates the teacher-student interaction, and enables a positive learning environment, not only in biology classes, but in all classes in general. It is also a helpful tool when it comes to class management, since the students learn to follow a certain behavior upon the realization of a simple gesture.
b. Language of art: in biology classes, several hands-on activities can be done in an artistic way, while explaining the biology concepts. This strategy is an approach to the theory of learning through having fun. Applying this strategy will bring the ideas closer to the minds of the students and make it easier for the students to memorize the presented material.
c. Drawing a path: the easiest way to memorize an idea, or to reach a realization about a specific explained topic, is to draw a logical path that helps the student reach the target idea using their common sense. This strategy may include using word parts to explain definitions, drawing thinking maps that lead to and explain a main idea, and many other methods. When the students learn as we draw a path for them, they eventually learn how to draw their own paths that suit their way of understanding of things, which widens their grasp of the concepts explained.
d. Use of technology: a great way to present the material to be explained is using power point presentations and prepared videos, as a way to engage the students and to avoid boring them. These presentations would better organize the ideas explained and the links between them. In addition to this, some virtual science labs are available online which can be used to engage the students even more, and help them understand an experiment when not feasibly done in classrooms.

Several activities and demonstrations will be done and presented during the session. Each activity will target a specific concept that can be explained in an innovative and creative way in the classrooms, by applying such activity. The activities to be done during the session will be over a total duration of 90 minutes, and are the following (will be presented in the following order):

a. Ice-breaker: (10 minutes) this activity's main purpose is introductory. It will allow the attendees to introduce their selves, and at the same time they will have to use a gesture of their own choice. The presenter, and each attendee will stand and present themselves, and will do his/her own gesture. The attendees will be asked to be creative and not to repeat a gesture that has been done before by another person.
b. Gesture using activity: (15 minutes) this activity aims to present to the audience some types of gestures that can be used in class while explaining, and allows them to get familiar with using such gestures. In this activity, the types of the presented gestures will be displayed. The attendees will be divided into groups of 4 to 5 people. Each group will take a topic about a biology concept (already prepared by the presenter). The target is for each group to find out the best way to explain the concept by the aid of several types of gestures. A group representor will present to the audience his/her group results.
c. Physical representation of mitosis: (15 minutes) this activity aims to show the teachers how to help students understand the concept of mitosis, by representing it physically. The attendees will be given cardboards, yarn, threads, buttons and sticky material. Each group will be asked to use the material to represent one phase of mitosis that is specified to them.
d. Agglutination reaction representation: (15 minutes) the goal of this activity is to show the attendees how to use the language of art to teach the students about the compatibility of the blood transfusion. The groups will be given cardboards of different colors, and will be asked to represent the agglutinogen on erythrocytes of donor blood group, and the agglutinin in the plasma of the receiver.
e. Science text cards: (13 minutes) this method helps convey the biology facts to be taught to students in a clear and organized way, while having fun. The activity will be done in the session by giving each group a prepared cardboard, divided into 2 parts, each with a specific category, following a specific pattern such as comparison, true/false, etc. They will also be given small cards that have scientific facts written on them, and the target is to classify these among the given categories.
f. Word parts activity: (15 minutes) this method can be used in classes to help students better understand the terms to be defined and memorized. In this activity, some words upon which this method can be applied will be given to the attendees and they are asked to divide them and explain the meanings of their parts in a way that would help students understand them.
g. Session evaluation: (7 minutes) as a final activity and to wrap up the interaction with the attendees and among them, the presenter will ask the attendees to give a brief evaluation about the session, expressing whether they have encountered some new ideas that they believe are applicable and useful for them in their teaching classrooms, and adding any comments they have in mind.

Using semiotic modalities in teaching sciences, and biology specifically, for intermediate and secondary classes is an essential factor that allows better understanding of the material explained,

which the target of every teacher is. Such methods help transform the class from a passive environment, from the perspective of students, into an active and interesting one.

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Entrepreneurship Education in the Classroom, A step towards Education 2030

Jinan Karameh Shayya, Entrepreneur Academy Lebanon

Globalization and the fast dynamic world are a challenge to be overcome by adaptation both at national and individual levels. Bringing entrepreneurship knowledge, skills, and attitudes into focus and integrating this field into education appear to be promising, since the potential lies in education 2030, education for sustainable development. Education 2030, adopted recently by the National Center for Education and Research, promotes 1) Economic growth, 2) Fair distribution of resources, 3) Full employment, 4) Favorable Balance of payment, and 5) Price stability which are the main objectives of entrepreneurship education. Entrepreneurship education can be defined as the purposeful intervention by an educator in the life of the learner to impact entrepreneurial qualities and skills to enable the learner to survive in the world of business. This developmental workshop aims to: a) introduce entrepreneurship education and its significance, and b) practice some Entrepreneurship education learning strategies that are applicable in the science classroom. This session is targeting science teachers and coordinators for middle and secondary levels. Participants will have the chance to share their experiences in this issue and reflect on their own practices and challenges that they usually face when implementing Entrepreneurship Education. Entrepreneurship Education practices would provide our students with the necessary knowledge, skills to adapt the context of the 21st century and to rise up with our nation.

Globalization and the fast dynamic world are a challenge to be overcome by adaptation both at national and individual levels. Bringing entrepreneurship knowledge, skills, and attitudes into focus and integrating this field into education appear to be promising, since the potential lies in education 2030, education for sustainable development. Education 2030, adopted recently by the National Center for Education and Research, promotes 1) Economic growth, 2) Fair distribution of resources, 3) Full employment, 4) Favorable Balance of payment, and 5) Price stability which are the main objectives of entrepreneurship education.

Entrepreneurship education can be defined as the purposeful intervention by an educator in the life of the learner to impact entrepreneurial qualities and skills to enable the learner to survive in the world of business (Erasmus, Loedoff, Mda and Nel, 2006). Entrepreneurial education and training provides individuals with the ability to recognize commercial opportunities, self-esteem, knowledge and skills to act on them. It includes instruction in opportunity recognition, commercializing a concept, managing resources, and initiating a business venture. It also includes instruction in traditional business disciplines such as management, marketing, information systems and finance. Entrepreneurs or the move towards self-employment is, and will continue to become,

an increasingly important element of economic growth and development. It is essential to have the infrastructure required to facilitate entrepreneurial mind-set and encourage self-employment. Having a culture of the creation of a new enterprise is a critical aspect of this infrastructure, as it will encourage students to take the risk of starting a business (Grecu & Denis, 2017).
In most definitions of entrepreneurship, there is an agreement that the entrepreneur: 1) is innovative, 2) organizes or reorganizes economic-social mechanisms in order to convert the situations and resources into practical cases, and 3) undertakes risk or failure (Sharper, 1998). Entrepreneurship is the ability to create knowledge out of nothing, the capacity to understand how to find, organize, and control the resources which are mostly in hands of others (Timmons, 1999). Entrepreneurship education puts emphasis on imagination, creativity, and risk acceptance in business, on the contrary, traditional views put more emphasis on quantitative techniques than development of creative skills (Porter, 1994). Other aspects that can be promoted through entrepreneurship education include: communication, problem-solving skill, team work, self-management, and planning. (Fones, 2004)

Research showed that implementing entrepreneurship education involves six components: 1) helping the learners to learn how to learn (metacognition), 2) important knowledge consists of both knowledge transfer and knowledge reconstruction (Contextual teaching and learning), 3) providing conditions under which the learners can practically work on issues (Problem based learning), 4) helping the learners to develop the frameworks and models of their decisions (STEM Education), 5) persuasion of cooperative learning, 6) persuasion of system thinking to understand and promote business measures (Vakili, Tahmasebi, Tahmasebi, & Tahmasebi, 2017).
This developmental workshop aims to: a) introduce entrepreneurship education and its significance, and b) practice some Entrepreneurship education learning strategies that are applicable in the science classroom. This session is targeting science teachers and coordinators for middle and secondary levels. Participants will have the chance to share their experiences in this issue and reflect on their own practices and challenges that they usually face when implementing Entrepreneurship Education. The session will start with an icebreaker activity (5 min), then a small introduction about Entrepreneurship Education will be presented and discussed (10 min), the participants will then enjoy practicing an activity (5$ exercise) so that they can assess their entrepreneurship skills (20 min). After the activity, the six components of education for Entrepreneurship Education will be discussed (15 min). The participants will watch a movie about a strategies done in classroom to integrate Entrepreneurship Education (10 min) and then in groups, participants will practice an activity that could be done in their class (Market your idea) (15min). The presenter will explain about how to do a feasibility study (15 min) then, in groups, the participants will practice doing their own feasibility study and present it (20min).
Entrepreneurship Education practices would provide our students with the necessary knowledge, skills to adapt the context of the 21st century and to rise up with our nation.

Innovative Idea Sessions

Thinking of Mathematics as Communication

Samia Henaine, Houssam Eddine Hariri High School, Lebanon

When people think of communication, they typically think about activities, such as writing, drawing, speaking, or using body language, and they often consider language teachers as the only persons responsible for children's communication development. Researches and educators have emphasized during the last two decades the importance of inquiry and mathematical problem solving, which are suffused with talk: questioning, explaining, communicating, debating, sharing and presenting strategies. Although we all convinced of the importance of these approaches, we cannot ignore the challenges that we are facing since our children do not learn Mathematics in their mother-tongue language. This session will discuss the factors that hinder students from communicating their thinking, the reasons of students' failure in solving Math problems, and the strategies, ideas, and tools that can be adapted to any math concept or grade level in order to help students be good communicators. Moreover, participants will be asked to communicate about the kinds of experiences they have had in teaching Mathematics, the solutions that they have tried, and their points of view on how best they consider Math teaching to be.

Introduction: How do I intend to open my session? ***(10 min)***

I intend to introduce my session by an Icebreaking activity: "BINGO to Meet You!". Each participant will be given one bingo card and be asked to circulate and try to find other participants who match with the descriptions on his/her card. The goal is to mark a complete row, a column, or a diagonal.

Then, in groups, participants have five minutes to discuss a list of misconception statements. Participants will be required to create a symbol representing themselves and attach it to a continuum that indicates to what extent they agree or disagree with each statement. Note that these statements are the generalizations that I intend participants to comprehend by the end of the session. Moreover, a "Strategy Toolbox" chart will be utilized during the session.

Body of the session: What are the next steps that I intend to follow?

The body of the session will be divided into three parts.

Part 1: ***(25 min)***

The goal of this part is to convince participants that students' reasoning and communication skills can be taught and developed.

1. Put participants in learners' shoes and ask them to do four consecutive activities: an exercise about mental calculation, an example of WODB (Which One Doesn't Belong) tool, a game using directions, and an assessment using a Caroll diagram. A discussion will follow these activities to demonstrate how these types of engagements can be used in classrooms in teaching and learning or even assessment in order to help students build computational fluency, number sense, and mathematical reasoning as well as both oral and written communication, and how they could be adapted according to the taught concepts or grade level. Moreover, participants will be provided by a weekly lesson plan

that organizes and facilitates the teachers' planning in order to promote the use of Math routines.
2. Read articles about Math routines and the role of mental math and computational strategies in strengthening accuracy, efficiency, and flexibility
3. A moment for reflection using: "I was surprised…, I learned …, I feel… "

Part 2: ***(10 min)***

The goal of this part is to notify participants that the challenges that our students are facing while learning Mathematics in a foreign language is an international problematic.

1. Provide participants with articles and research studies in teaching and learning mathematics in multilingual classrooms. They will share their findings using the Carousel strategy.
2. Write a headline about teaching and learning mathematics in multilingual classrooms.

Part 3: ***(25 min)***

The goal of this part is to demonstrate for participants that student's disabilities in Language are not the only factor that hinders students from communicating their thinking in Mathematics.

1. Examine three different types of students' sample work in order to interpret and discuss the causes of mistakes encountered; non-authentic problems, inadequate language, and inappropriate strategy are some reasons of students' failure in solving Math problems.
2. To overcome these difficulties, participants will be engaged to do the following:
   - Explore the different types of word problems: Joining, Separating, Comparing, Part-Part Whole. Then, use these types to point out the misconceptions that students can make.
   - Transform given non-authentic problems to be relevant to students' culture and life.
   - Find a way to deal with students' irrelevant answers by encouraging them to think about their thinking (metacognition).
3. A moment for reflection using: "I used to think…, Now I think…, I understand that…"

Conclusion and Reflection: How do I intend to close my session? ***(5 min)***

Participants will return to the continuum and change their position based on the knowledge gained during the session. Moreover, I will go back to the "Strategy Toolbox" chart and look at the written strategies that can be also used with students.
Finally, participants will write a reflection on how this session extended or pushed their thinking in new directions, what is still challenging or confusing for them, and how they will implement the new acquired knowledge.

Representations as Tools for Thinking in a Problem Solving Context

Rana Aboul Hosn, Lebanese American University, Brummana High School, Lebanon

1. Teaching through problem solving is considered a challenge in a multilingual classroom where students use a different language than the native language spoken at home. Moreover, solving math word problems, which requires the engagement in different cognitive actions has always been difficult for students at elementary and middle school

levels. Research and experience show that a successful problem-solving teaching and learning model needs to include a construction of visual schematic representations that show relationships between the different components of the problem. Representations such as tables, graphs, diagrams and pictures extensively and functionally used when teaching improve the development of students' reasoning and problem solving abilities.

2. The purpose of this workshop is to engage elementary and intermediate math teachers in activities that show the importance of integrating "representations as tools for problem solving". Participants will have the chance to share their experiences in their classrooms regarding their students' representations. At last, participants will be able to design mini-lesson scenarios with greater emphasis on representations as tools for thinking and problem solving.

Introduction:

Teaching through problem solving which is the focus of mathematics education nowadays is considered a challenge in a multilingual classroom where students use a different language than the native language spoken at home. Chval & Chavez (2012) identified "connecting language and mathematical representations" as one of the several strategies that research has shown to support mathematics learning in a multilingual classroom.

According to Lester & Kehle (2003), students become successful problem solvers when they connect information, prior skills and common representations to create new ones that decode the ambiguity in the features of the original problem situation. Consequently, representations assist the student in both, reasoning to generate the correct solution and conceptual understanding that is essential to explain and communicate the way of thinking while solving a problem. Therefore, representations go hand in hand with problem solving strategies.

Strategy:

This workshop is based on mentioned review of the literature and multitude of resources and on my Master's thesis entitled "Representations and Proportional Reasoning in a Problem Solving Context" and conducted at the Lebanese American University. The purpose of this workshop is to introduce elementary and intermediate math teachers to the importance of integrating "representations as tools for problem solving" in a multilingual mathematics classroom through which participants would be able to enrich their lessons and approaches with multiple representations that will induce students' use of representations as tools for communication and thinking while solving problems.

Moreover, participants will be involved in various interactive strategies that support "representations as tools for problem solving" through cooperative group work.

Description

The session will start with an icebreaker activity to practice visualization through which participants in groups choose image cards related to class setting, management, practices, etc. to answer the question "What do I/We want class to look like?" and glue them on a poster then speak out loud about them and why they are important (10min). Then the definition of mathematical representations and the significance of "representations as tools for problem solving" will be presented showing the function of a representation as a tool for communicating mathematical information in addition to understanding and thinking (10min). The participants will work in groups to apply the developed ideas to identify the type of a representation (table, diagram, equation, graph, etc.) as well as its function in selected mathematics book chapters at elementary and middle school levels (15min). In a second activity, groups of participants will be given two different plans for the same lesson in order to compare the functions of representations used by teachers to approach the proportionality concept (15min). In a third activity, groups will be given samples of students' work on problem solving in order to investigate the students' reasoning and the function of each representation when used. In the last activity, groups of participants will be asked to change any of the problems figuring in the book chapters distributed in the first activity into problems rich in representations as tools for thinking and problem solving (15min). It should be noted that participants will be invited to discuss and reflect upon their findings at the end of each activity. The rest of the time will be spared for participants' questions, suggestions, and evaluation (10 min).

Conclusion

"Problem solving" is recommended as a learning approach not only as a goal for learning mathematical concepts; students must be provided with more opportunities to learn through problem solving of real life situations that is essential in promoting students' mathematical understanding of concepts, processes and techniques. Moreover, students'

understanding needs to be self-generated instead of being imposed by a teacher or a textbook. Awaiting a complete reconstruction for the Lebanese mathematics curriculum and textbooks to be accomplished, teachers are advised to properly include and implement multiple representations in both curriculum and approaches used for any lesson in order to enhance the understanding of the concepts and equip students with tools that will contribute to the development of problem solving abilities.

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Rendre l'enseignement scientifique interactif et attrayant.

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Les défis que rencontre l'enseignant dans le domaine de la science sont nombreux : comment stimuler le questionnement et la participation de l'élève au cours? Comment le guider vers un échange continu entre lui et le professeur pour acquérir une meilleure compétence de communication? Comment lui donner le goût de la science et rendre l'expérience un moyen de vérifier une chose palpable qui produit chez l'élève une émotion ? Nous apportons, par la suite des réponses à toutes ces questions : il faut retrouver des situations d'apprentissage qui permettent de réaliser un enseignement actif et attrayant . C'est tout petit, que l'enfant prenne le goût des expériences soit en chimie, en physique ou en biologie. Par exemple, un enfant qui a compris qu'une chose comme la cuisine est de la chimie aura moins de difficultés à aimer cette discipline à l'école. D'une manière générale l'enseignement doit être interactif et concret : Il faut apprendre à l'enfant comment il doit apprendre lui-même ses leçons. On peut présenter des sujets de discussion avec les élèves autour de la leçon et valider cette dernière avec eux ; cette méthode est basée sur une information de va-et-vient entre élèves et enseignant. Ainsi les élèves acquièrent une meilleure compétence de communication qui se répercute plus tard dans les classes supérieures et par suite dans leur travail dans le monde. Pour conclure, on peut dire que l'enseignement scientifique doit être attrayant et interactif en faisant participer les élèves pour réaliser le cours avec le professeur. Il est évident que la **méthode dite active** est meilleure pour l'apprentissage et la compréhension.

La séance est pour 75 minutes, on présentera un exposé expliquant les divers moyens ludiques et concrets qui peuvent rendre l'enseignement des sciences interactif. Un débat avec les enseignants

consolide l'exposé. Cette séance est ouverte aux enseignants des cycles primaire et complémentaire.

My Mother's Sphygmomanometer

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Innovations in life start by creativity and everyone can be motivated in order to innovate. The aim of this session is to share with my colleagues an observation I had witnessed during my childhood and adolescence. Measuring one's blood pressure is possible through a measuring tool "the sphygmomanometer". However, my mother who is neither a medical expert nor had a sphygmomanometer at that time, followed a different strategy with different tools and enabled her to monitor the blood pressure of neighbors and relatives who had chronic hypo or hypertension. The curiosity triggered by such an observation at that time and the passion I have as a Biology teacher to promote critical thinking and "problem-based learning" had a great impact on my teaching strategies. In this sense, the term "variable" in learning science has been concretized and students are able to live and apply the scientific method rather than being a chart for memory. Through a well- designed hand-on activity, participants in this innovative session will be able to live this observation "my mother's sphygmomanometer" in groups of two, collect data and share their findings. The innovative session will highlight the significance of such related activities in students' life and their acquisition for the 21st century competencies: creativity, scientific method, collaboration, problem solving, analysis, research skills and using data.

1. Introduction

Throughout one's life, everyone is exposed daily to tens of incidences many of which may not be realized as being observations that constitute the cornerstone of scientific inquiry. I have been one of these individuals who has witnessed during his childhood and adolescence his mother using odd tools with a different approach to measure the blood pressure of our neighbors and relatives at that time, who used to suffer from chronic hypo or hypertension. Neither being a medical expert nor having a "sphygmomanometer" the measuring tool to measure one's blood pressure, I had a growing curiosity and passion to decode the secrets behind my mom's technique. Nevertheless, collected data were always of great relevance and especially when compared to those ones recorded by the classical sphygmomanometer of a doctor who used to recheck these individuals with hypertension or hypotension cases. In brief that was my mother's sphygmomanometer before becoming one of my strategies as a Biology teacher whose ultimate goal is to promote critical thinking.

2. Strategy

An observation is anything that triggers our curiosity to ask a question and therefore the inability to generate a question indicates the absence of any observation and thus

eliminating any attempt to proceed in the protocol of the scientific method. In this innovative session, participants will be using the elements of the so called "my mother's sphygmomanometer" and applying its protocol. Participants will be able to raise questions based on such an observation and propose different hypotheses. In the attempt to test the validity of the formulated hypotheses, participants have to list all the possible variables that should be taken into consideration in order to validate the suggested hypotheses. In brief, this innovative strategy will enable participants to be engaged in the implementation of such idea in classes to generate scientific reasoning and scientific literacy which are the bases of any scientific research and essential skills to be acquired in the 21st century.

3. Description of the session

The innovative session will be subdivided into three parts: An introduction, participants' involvement in the activity and an interactive discussion to share data and findings.

Part 1: Introduction

The basis of this innovative tool for blood pressure measurement relies on three elements: a sewing meter, a thread and a gold ring. The presenter will start by an icebreaker that highlights the significant use of each of the three elements in one's life before introducing the participants to this approach by an interactive demonstration that integrates these three elements and thus revealing the principle of the so called " my mother's sphygmomanometer".

Part 2: Participants' involvement

The unique demonstration using a gold ring will involve one volunteer whose blood pressure will be checked twice:

First by using my mother's sphygmomanometer

a- Extend the sewing meter along one's forearm such that the starting edge of the sewing meter indicating 1cm value is placed exactly at the pulse site of the wrist

b- Take the 16 cm thread and hang the gold ring (each side would be ~ 8 cm)

c- Hold the hanged gold ring at a distance of 1-2 cm from the surface of the sewing meter

d- Displace the hanged gold ring gently away from the wrist site towards the elbow

e- Observe the gold ring as it oscillates and record the number at which oscillation starts.

f- The recorded value represents your blood pressure

Second by using the classical sphygmomanometer

The number of participants that ranges between 20 and 35 will be divided in groups of two. Each group will receive a set "a zipper bag" with the following items: a. sewing meter

b. a thread
c. one or two substitutes of a gold ring whose nature, size and texture vary as well as from group to another.
d. a sheet for instructions and questions “sheet 1”
e. a sheet to record data “sheet 2”
Participants will repeat the procedure “demonstration” steps **a** through **f** and record all findings to be shared and discussed later

Part 3: Sharing data and findings

Each group will be asked to share his findings based on the enclosed variables in the zipper bag. Participants will be asked to list the variables they thought about in order to suggest answers that explain the observation as well as their own findings in each group. These variables shall be posted on the whiteboard using magnetized tags and classified as manipulated, responding and controlled variables.

4. Conclusion

As a Biology teacher, an inventor and a researcher knowledge is based on facts and facts originate from data which have been collected through experimental procedures, well designed protocol and accountable and reliable measurable tools. Nevertheless, such observation is an observation regardless the term I adopted “my mother sphygmomanometer” and the tools used. Hence, it is our choice as science teachers in class regardless the subject matter we teach to replicate such related activities in order to motivate our students and trigger their curiosity to ask questions, suggest hypotheses, design plans for testing the validity of the suggested hypotheses, collect and record data and generate conclusions based on their own findings and analysis. In this sense I strongly advise all science teachers to make use of all elements that surround us in everyone’s school community and make use of by motivating students to be scientifically curious and literate. My mother’s sphygmomanometer didn’t only trigger my curiosity at that time as a kid but rather shaped my character of being an interrogative person and this is what I am conveying to my students in order to enhance their critical thinking and help them achieving knowledge through problem-based learning and thus building student-characters equipped with 21st century competencies as a major key for success in life