UNIVERSITY OF CENTRAL ASIA
Education Improvement Programme

Education for the 21st Century in Kyrgyzstan:
Current Realities and Roadmap
for Systemic Reform

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Acknowledgements

Executive Summary

Responding to an urgent need to enhance students' academic competence and prepare a quality workforce in the mountainous regions of Central Asia to meet the challenges of the 21st century, the Education Improvement Programme of the University of Central Asia (UCA-EIP) embarked on a mission to identify how best to achieve this. This programme consists of stages of situational analysis, recommendations for policy and practice improvements, implementation of programmes to improve teaching, learning and assessment and evaluation of their impact. This report presents a first stage task -- a comprehensive situational analysis on the current state of secondary education in Kyrgyzstan. A sample of 20 secondary schools, located in six villages, nine small towns and five cities were included in the study. 382 students of grades 7-11, 112 teachers, 40 school leaders, and 120-160 representatives of Parent Committees and Board of Trustees from all seven oblasts as well as Bishkek and Osh were surveyed or interviewed, and 108 lessons observed for this situational analysis. This situational analysis specifically focuses on the teaching and learning of STEM, ICT and English as well as 21st century skills.

Increase public spending on education and spend it appropriately and efficiently

The schools offer education from grades 1-11, with some offering pre-school education as well. The schools have on average 1,136 students, 3 school leaders, 39 teachers and 3 support staff. Most of the schools are housed in purpose-built buildings with adequate heating and lighting systems but there are not enough classrooms for the number of students, so the schools must operate in two-shifts and even three-shifts. There is a severe lack of adequate resources reflected in the shortage and inadequacy of teaching staff, the serious inadequacy of ICT infrastructure and resources, science equipment and materials and even textbooks for students! The lack of adequate infrastructure and resources severely hinders instruction and student achievement. *It is important that the government increases public spending on education and spends it appropriately and efficiently to meet the goals for education set out in the sector's strategic development plans.*

Give schools more autonomy and build school leaders capacity to use their autonomy effectively

Schools share autonomy with the Ministry of Education and Science and the local education authorities. Schools have little autonomy in determining the allocation and use of resources and in decisions regarding curriculum and instruction. *School leaders should be given greater autonomy in determining and using budget allocations to address human and physical resource shortages. They should also be given more autonomy with respect to curriculum and instruction to improve student achievement. At the same time the capacity of school leaders should be built to use their autonomy and ensure more effective schools.*

Undertake a fundamental reform of teacher remuneration to attract and retain teachers

Most teachers (97.3%) have a higher education diploma, the qualification required to teach in schools in Kyrgyzstan. However, there is a shortage of teachers as many teachers in the schools are at retirement or post retirement age. This portends to a severe teacher shortage in the future. Teacher remuneration that is not enough for living a quality life fails to attract and retain competent young people to the profession. *It is imperative that the government undertake a fundamental reform of teacher remuneration to attract competent young people to the profession and subsequently retain them. It must do away with the 'Stavka' system that*

pays teachers based on their teaching load and put in place a system that recognizes all the pedagogical work required for effective teaching.

Set benchmarks for primary, lower and upper secondary levels and clear learning outcomes for each subject grade-wise

The State Standards for Education are clearly aimed at developing curricula and the 21st century skills of students as do the subject curriculums but to varying degrees. Key limitations of the curriculum are the lack of benchmarks for each developmental level, clear statements of student learning outcomes grade-wise, a major focus on subject content rather than on key curricula and cross curricular skills and the absence of exemplars of 21st century pedagogies, formative and summative assessments. *It is recommended that the subject curricula be further developed to address the limitations mentioned above and enable realization of the goals identified in the State Standards for Education.*

Develop the ICT curriculum for grades 1-4 and 10-11

The fact that the ICT curriculum is designed only for grades 5-9 is a concerning issue especially today, with the ubiquitous use of technology in everyday life, education and work. *It is recommended that the ICT curriculum be developed for the primary grades (1-4) as well as upper secondary grades (10-11) to develop students' ICT skills for college, career and citizenship.*

Develop professional standards for teachers

There are no professional standards for teachers specifying what they should know, be able to do and the qualities of character they should have. Teacher professional standards delineating the competencies teachers must have to play new roles and enact new teaching practices is a first step to ensuring effective implementation of the new competence-based curricula and realization of the goals of the new state standards. Teacher professional standards are important as they serve as a framework for decisions regarding selection of teachers, guide their professional development and determine career advancement. *It is recommended that teacher professional standards be developed specifying what teachers should know, be able to do and the character qualities they should have.*

Redesign initial teacher preparation programmes

Only 62% of the teachers passed the subject knowledge test conducted by the National Testing Centre in 2011 in the Naryn oblast. Among all subjects, physics teachers performed the worst. There were huge differences between the maximum and minimum scores of all the teachers indicating their levels of subject knowledge varied considerably. Teachers use traditional teaching methods, emphasizing teacher demonstration and student memorization. The teachers use a variety of instructional activities, the most frequent being completion of textbook tasks. Students are required to do these tasks individually more frequently than in groups. Teacher questioning occasionally leads to discussion and debate. Project work is much less exercised in all subjects. Inadequate integration of ICT into teaching and learning was also observed. Teaching practice is affected by a content-loaded curriculum which teachers feel they must cover, so it is not surprising they focus on curriculum coverage rather than student learning. There is little understanding and use of formative assessment, and summative assessment is largely based on requiring students to regurgitate textbook content. *It is recommended to design new initial teacher education programmes to ensure the*

development of teachers as per the professional standards and to enable them to play new roles and enact new practices according to the requirements of a competence-based education system. Initial teacher education programmes must include a well-designed and implemented practicum to ready prospective teachers to engage in effective classroom practice. Simultaneously a continuing professional development programme be developed and offered to teacher educators in universities and pedagogical institutes to prepare them to offer the new programmes.

Allow prospective teachers to specialize in more than one discipline

In addition to the general shortage of teachers, there is also a shortage of qualified teachers especially in physics, chemistry and mathematics. This shortage will undoubtedly be exacerbated as teachers at retirement and post-retirement age leave the system. *It is recommended that initial teacher education programmes be developed to allow prospective teachers to specialize in at least two disciplines obtaining a major in one discipline and a minor in another or better still offering double degrees. It is also recommended to recertify existing teachers to teach another discipline related to the one they are currently certified in. Moreover, professionals in the field could be required to take certain teacher education courses and be certified to teach.*

Develop a comprehensive continuing teacher professional development programme

All the teachers participate in in-school professional development activities, observing each other's lesson and engaging in dialogue with colleagues which has a positive impact on their teaching. These activities are important but if teachers are to stay up to-date in their profession, they must also have access to professional development external-to-the-school. Nearly all teachers want more professional development but because of the lack of financial resources, they do not obtain it. The areas of high need identified by the teachers are ICT, subject knowledge and understanding, new teaching methodologies, individualized and experiential learning, teaching students how to learn, career counseling and guidance, and cross curricula skills. *It is recommended that a comprehensive continuing teacher professional development programmes be developed to enable teachers to deliver the 21st century skills through the core subjects, use new pedagogies that promote 'deep learning', formative assessments to diagnose and address learning gaps and summative assessment to assess achievement of the learning outcomes and thus make the transition from traditional to competence-based instructional practice. The programme must include a mentoring programme for new teachers to facilitate their success in the classroom and their development as teaching professionals. It must also include need-based professional development for all teachers, delivered over time through in-school and external-to-the-school activities followed by school-based coaching to facilitate effective implementation of the new learnings and reflection on practice to improve it. The continuing professional development programme should lead to professional qualifications such as a post-graduate certificate in education (PGCE) and further to a master's degree. Simultaneously a continuing professional development programme be developed and offered to methodological heads in schools and teachers educators in pedagogical institutes to prepare them to offer the new programme.*

Provide budgetary support for schools to implement the comprehensive continuing teacher professional development programme

Nearly all teachers want more professional development but only 10% of schools have a budget for it. Because of the lack of financial resources, teachers participate in professional development programmes offered for free, rather than on need or pay to attend offerings they see as relevant to them. T*he government should include allocations for continuing teacher professional development in budgetary support based on the comprehensive teacher professional development plan each year.*

Prepare science teachers to facilitate students conduct of science investigations, and interpretation and explanation of scientific data

Science teachers are very confident in their preparedness to teach the science curriculum, except for developing the key skills of explaining phenomena scientifically and investigating and interpreting scientific data. They do not feel prepared to conduct or have students conduct experiments nor engage students in discussion and enquiry on scientific ideas and investigations. Lesson observations reveal a dependence on the textbook for science teaching, learning and assessment. *It is recommended that both initial and continuing teacher education better prepare science teachers to facilitate science investigations, discussion and enquiry in their classrooms. Science teachers be taught to conduct effective demonstrations of experiments, facilitate students conduct of experiments using easily available materials and interpret and draw conclusions from the data.*

Prepare mathematics teachers to develop students problem solving and higher order thinking skills and use them to solve real-world problems with the support of digital technologies

Similar to the science teachers, the mathematics teachers are confident in their preparedness to teach the mathematics curriuclum. They are more confident in using traditional teacher-centered methods than the student-centered methods of enquiry and discussion. They feel least confident in incorporating ICT in their teaching and using formative assessment to facilitate student learning. In mathematics lessons, teachers generally demonstrate how to solve textbook problems on the board and have students use the same algorithm to solve similar problems. Teaching students to use higher order thinking skills to justify their answer and choice of method is much less exercised. *It is recommended that initial and continuing teacher education prepare mathematics teachers to use instructional strategies that encourage students to develop problem solving, logical reasoning and abstract thinking skills and to apply learning to solving real-world problems. They should also prepare them to embed ICT into their teaching and student learning. They should provide school-based coaching to ensure effective implementation of new learning and critical reflection on classroom practice to further improve it.*

Prepare informatics teachers to use project-based learning to develop ICT skills for life and work

The informatics teachers express more confidence than the other subject teachers in their prepardness to teach their subject. Teacher demonstration is the most common instructional strategy. Teachers seldom have students work on extended projects to develop and apply skills to real-world situations or facilitate development of commonly used ICT skills, such as, browse the internet for information, communicate via email, edit digital photos, or create and maintain websites. Reasons for the failure may be the lack of ICT infrastructure and

resources and teachers' lack of skills in project-based learning. *It is imperative that the government improve ICT infrastructure and resources to facilitate development of a range of ICT skills and initial and continuing teacher professional development enhance teachers abilities to use the resources efficiently and effectively and to conduct project-based learning.*

Appoint new English teachers with a minimum C1 on the CEFR and support existing teachers to attain proficiency to this level

Only a few English language teachers think they are very well prepared to teach all aspects of the curriculum. About two-thirds of them hold they are well prepared to teach grammar and vocabulary and the four language skills of listening, reading, speaking and writing. Preparing students to communicate in English, assessing the four language skills and using ICT for teaching and learning are areas in which half of the teachers feel only somewhat prepared. Lesson observations indicate that the grammar-translation method is the predominant teaching method, with teachers focusing on teaching vocabulary and grammar far more than on developing students language skills. This is possibly due to the fact that many of the teachers own English language skills are poor. *Appoint English teachers with a minimum C1 on the CEFR levels to teach English and those not at that level be supported to attain proficiency to this level. English teachers be provided professional development to learn how to develop students critical reading, writing, listening and speaking skills.*

Provide a quality English language teacher rather than divide a class into two groups

Despite the lack of teachers with the necessary language skills, a small class of twenty-four students is divided into two groups of twelve for instruction. Research shows that smaller classes do not produce better learning outcomes, quality teachers do! *It is also recommended that a class of twenty-four students not be divided into two groups for English, but the whole class by taught by qualified teachers proficient in English.*

Enusre all stakeholders understand that all children can learn and prepare teachers to teach a class of diverse students

In Kyrgyzstan's education system there is too much emphasis on identifying and developing high performers, students who can win Olympiads and bring accolades to their schools, districts and oblasts. As a result teachers focus on the 'best' students, leaving the 'struggling' students behind. With the focus on high performers, it is not surprising that mathematics (61.5%), science (55%) and English (42.8%) teachers believe that only academically competent students should study their subjects. *It is recommended that a media campaign be launched to develop the understanding that all children can learn. Moreover, initial and continuing professional development programmes design courses and workshops to help teachers understand that all children can learn and prepare them with the knowledge, skills and attitudes to teach a class of diverse students.*

Address the gender bias of mathematics and science teachers

Although most mathematics and science teachers are female, and national and international assessments of learning show girls perform at par or better than boys, nearly half of the teachers believe boys are better than girls at learning their subjects. *It is recommended to undertake research to identify the reasons for teachers' beliefs about the gendered nature of learning. It is also recommended that initial and continuing teacher professional development programmes address the gender bias of mathematics and science teachers.*

Set a minimum number of days for students and teachers to attend school and ensure there are no interruptions during lessons

The school climate is very positive. There is practically no bullying or verbal and physical abuse and the relationship among all school groups is respectful and cooperative. One factor negatively impacting school climate is the absenteeism and late arrivals for class by teachers and students and the number of class cancellations and interruptions. A quarter of students missing an entire school day, missing some classes and arriving late at least once a week is a high percentage and detrimental for learning. Combining this issue with teacher absenteeism, class cancellations and interruptions only increases the harm to student learning. *The government should set the minimum number of days schools must be open and the minimum number of days teachers and students must attend school. Moreover, school leaders must address the issue of class cancellations and interruptions by better scheduling and encourage the use of cooperative and authentic learning which are known to reduce student absenteeism. Furthermore, school leaders must obtain parent support to ensure student regular attendance and reduce tardiness.*

Set a goal for all students to reach in the NASEA in three years and provide the necessary support to disadvantaged schools to attain it

In terms of student learning, the National Assessment of Student Educational Achievement conducted in 2017 shows that grade 8 students made the most progress in reading between 2009 and 2017. While progress was made in the natural sciences, 80% of students did not reach the basic level in physics and 70% in chemistry. A decline was seen in mathematics from 70.9% in 2009 to 64.9% of students not reaching the basic level in 2017. This is evidence of a lack of knowledge and understanding in all subjects. A lack of higher order thinking skills is also in evidence as the most difficult tasks for students in reading were connecting the text to real-life, using the information to solve practical problems, and drawing conclusions. In responding to open-ended questions, all students found it difficult to independently formulate thoughts, provide evidence and examples, and draw conclusions. Furthermore, results show that location, medium of instruction, gender and school system are variables influencing student performance. *It is recommended to set the goal for all students to at least reach the basic level and preferably 65% of the students to reach the upper basic level in the NASEA in three years. Moreover, it is necessary for the government to communicate this goal to all schools and provide the necessary support specially to disadvantaged schools.*

Provide all students up to-date textbooks for all subjects

Data from this study shows in only a third of science and English classrooms are textbooks sufficient for students and in less than a tenth of mathematics classrooms does each student have a textbook. Moreover, most textbooks are outdated and as such would not facilitate students in achieving the competencies identified in the state standard and curricula. *It is imperative that each student be provided an up to-date textbook to acquire the 21st century competencies delineated in the curricula and state standard. Developing quality textbooks requires expertise and time. It is recommended that textbooks already available in the market be reviewed, contextualized and approved for use in schools.*

Bring the assessment system in schools and for university entrance in line with the requirements of a competence-based education system

Data from this study reveals that in subject lessons students engage in lower order thinking activities much more frequently than higher order thinking activities, memorization is still the dominant student learning strategy and students make little use of ICT for learning. *The assessment system both in schools and for university entrance must be brought in line with the requirements of a competence-based education system. This will facilitate the teachers to translate their constructivist educational philosophy into everyday practice by using pedagogies like project-based learning, enquiry, cooperative learning, giving challenging and ICT embedded home assignments, and using formative and authentic summative assessments to develop students' curricula and cross curricula skills.*

Direct students' high motivation, education and career aspirations into STEM and IT professions through provision of workplace learning experiences

Students hold positive attitudes and are highly motivated to learn, have high educational and career expectations and these expectations show a promising outlook for themselves as well as the country's future workforce. *Students interest in professions in health care and ICT be furthered and more students encouraged into the science and engineering professions. One way to do this is by schools establishing partnerships with business and social enterprises to provide short-term internship opportunities to students to enable workplace learning.*

Use students' positive perceptions of school and the supportive learning environment at home to challenge them intellectually and enable them to improve their performance

In terms of well-being, most of the students have very positive perceptions about their school lives and their relationships with their teachers and peers. Parents not only provide a comfortable home and supportive learning environment but also spend time before and after school talking with their children, enquiring about their school day and encouraging them to do well at school. Students also spend time talking with and playing sports with friends. Most students feel a sense of well-being in all its dimensions with 68.3% reporting they are very satisfied and 17.8% satisfied with their current lives. *It is recommended that teachers use students' positive perceptions of school and the supportive learning environment at home to challenge them intellectually and enable them to improve their performance. They should also educate parents on how to facilitate their adolescent children's learning through providing informal, experiential and work-based learning to enable improved performance.*

Develop professional standards for school directors and use them to design programmes to prepare them to enter and continue working effectively in the position

Most school directors come through the ranks of teachers and many have served as deputy directors previously. They are expected to be visionary leaders, experts in teaching and learning, skilled administrators, effective human resource managers, good public relations officers, and adept fund raisers. However, there is no formal education provided prior to assuming the position of school director and few continuing professional development opportunities, limiting the effectiveness with which they could fulfill their varied roles and challenging responsibilities. *It is recommended to develop professional standards for school directors and use them to develop formal programmes to prepare them to enter the profession. Existing school directors be offered need-based continuing professional development that is structured, practical and regular.*

The teacher appraisal system in schools clearly distinguish between teacher appraisal for development and teacher appraisal for evaluation. Appraisal for development result in need-based professional development and appraisal for evaluation in reward or censure

Teachers are regularly appraised and receive feedback following lesson observations from multiple sources. The highest importance in feedback is given to their subject knowledge, subject pedagogical knowledge and relationship with students. The least importance is given to achievement of student learning outcomes, test scores or pass rates. This is concerning as the purpose of teacher appraisal and feedback is to enhance student achievement through improved teaching. Most teachers perceive the methods used for appraisal to be effective but not the outcomes as appraisal does not result in more opportunities for professional development, increase in salaries or advancement of careers of high performers, nor in the dismissal of sustained poor performers. They also perceive the appraisal and feedback process as being undertaken simply to fulfill administrative requirements. T*he teacher appraisal system in schools should clearly distinguish between teacher appraisal for development and teacher appraisal for evaluation. Teacher appraisal for development must be more holistic considering teacher and student performance over time and be clearly linked to provision of professional development aimed at improving teacher performance and thereby student learning outcomes. Teacher evaluation for accountability be clearly linked to rewards for good performance and dismissal for sustained poor performance. The government should also put in place a career ladder for teachers and use it to reward sustained high performers.*

Parental involvement be furthered to assist schools to achieve higher academic standards and by schools educating parents on ways to further their children's academic socialization.

Parents actively engage with and support their children in their lives at home and at school. They have high expectations for their children and consequently of their children's schools. Parents expect their children to obtain good grades, complete secondary education and obtain higher education. When they have a choice, they carefully choose the school for their children and put pressure on the school to achieve higher academic standards. More specifically they want schools to ensure their children are fluent in Russian and English, develop knowledge and understanding of the sciences, hone their ICT skills, and inculcate the values of respect for elders and service to others. Many parents feel the schools are not meeting their expectations. Parents play an active role in the schools participating in local school governance, provision of monetary and non-monetary support and serving as a bridge between the school and the larger community. *This very positive parental involvement should be further developed to assist schools to achieve higher academic standards and by schools educating parents on ways to further their children's academic socialization.*

LIST OF ACRONYMS

BoT   Board of Trustees

CEATM   Centre for Education Assessment and Teaching Methods

EC   European Commission

FLEX   Female Leadership Exchange

FGD   Focus Group Discussion

GDP   Gross Domestic Products

KII   Key Informants Interviews

ICT   Information Communication Technology

MoES   Ministry of Education

NASEA   National Assessment of Students' Educational Achievement

NTC   National Testing Centre

OECD   Organization for Economic Cooperation and Development

ORT   *Obsherespublikanskiy* Test (National University Entrance Exam)

PC   Parents Committees

PCK   Pedagogical Content Knowledge

PD   Professional Development

RIPD   Republican Institute for Professional Development

PISA   Programme for International Students Assessment

SES   Socio-Economic Status

SIP   School Improvement Plans

SSE   State Standards for Education

SD   Standard Deviation

STEM   Science Technology Engineering and Mathematics

TALIS   Teaching and Learning International Survey

TPACK   Technology, Pedagogy, and Content Knowledge

TVET   Technical Vocational Education Training

UCA-EIP   University of Central Asia's Education Improvement Programme

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Section 1: OVERVIEW OF THE STUDY

The Country Context

Kyrgyzstan is a small, landlocked, predominantly mountainous, country of Central Asia. The country is divided into seven oblasts (provinces, states): Chui, Osh, Jalal-Abad, Naryn, Talas, Issyk-Kul and Batken. The capital - Bishkek, and the second largest city - Osh are administratively independent cities with a status equal to an oblast. The total population is over 6 million, with approximately 2 million under the age of 18. Over 90 nationalities and ethnic groups live in Kyrgyzstan. The two official languages are Kyrgyz and Russian. About 65% of the population are Turkic speaking Kyrgyz. In the south of the country Uzbek is spoken. As such there are Kyrgyz, Russian and Uzbek medium schools. The literacy rate is around 99%. Kyrgyzstan's economy is susceptible to external shocks because one gold mine, Kumtor, accounts for about 10% of GDP and worker remittances for about 30% of GDP. Unstable economic growth has led to increased poverty with 41% of the population living below the national poverty line and 22% living on two dollars or less a day (World Bank, 2017).

The Constitution of Kyrgyzstan gives all citizens the right to education in state educational institutions. To ensure all citizens the right to education, Kyrgyzstan spends 4.6% of its GDP on education, which is the highest in the region and at par with the average total expenditures in Central and Eastern Europe. Despite these impressive resources devoted to education, Kyrgyzstan fails to achieve satisfactory returns on education (OECD & IBRD/WB, 2010).

The Educational Context

The Law on Education 1992 provides the following structure for the education system: preschool, general secondary (primary: grades 1-4 and lower secondary: grades 5-9) and upper secondary (grades 10-11), technical/vocational secondary (grades 10-11), higher (academic and technical/vocational) and post-graduate education. Basic education (grades 1-9) is free and compulsory. Upper secondary education (grades 10-11) is free but not compulsory.

Higher education is provided by universities and institutes or in colleges offering specialized vocational/technical education. Since independence in 1991, private schools and universities have been set up. As of 2002 all secondary school graduates must pass a national university entrance exam to enter a state university.

Responsibility for education is shared across the various levels of government (Republican, oblast, district and local). At the Republican level, the Ministry of Education and Science (MoES) is responsible for defining and executing state policy in education including drafting regulations regarding the state funding of education, preparation and adoption of the state standards, curricula and syllabi, the training of specialists for higher education and international cooperation. The MoES also supervises the regional educational authorities and the educational institutions funded from regional budgets.

The MoES consists of several departments and organizations which perform executive functions and coordinate state policy. It has departments for each level of education and for strategic planning, financing and management of education. The Academy of Education is responsible for development and approval of textbooks and learning materials for schools.

An independent body the Centre for Education Assessment and Teaching Methods (CEATM) conducts the national assessments at grade 4 and 8 and the university entrance exams. The Republican Institute for Professional Development (RIPD) and its network of teacher training institutes and methodological centers are responsible for in-service teacher training.

In each oblast there is a Department of Education which implements state education policies at the oblast level and determines allocation of funds to education from its budget. The Oblast and District Departments of Education are responsible for the establishment, organization and management of educational institutions (except universities/institutes), the appointment of heads of the educational institutions, financing of educational institutions from their budget, and enforcing compulsory education.

There are 2,262 schools across the country with around 1.3 million children enrolled in them. The MoES estimates a need for 670 more schools (CABAR, 2018). Because of the lack of schools, some schools operate in two-shifts and others in three-shifts. Each school has a director responsible for the administration of the school. The school director is supported by one or more deputy directors who are responsible for the curricular programme, co-curricular activities and student discipline at the school. There are heads of methodology (teachers with additional responsibility) whose main task is to support instruction at the schools. Class size is generally small with 20-25 students but rises at the upper secondary level to 30-40 students.

The Law on Education guarantees the principle of self-government of educational institutions. As of 2009, schools have a Board of Trustees (BOT) that perform governance functions such as approving school policies, generating additional funds and addressing problems at the school. Universities, colleges and schools can also define their own curricula within the framework of state standards for education.

The Rationale for the Situational Analysis

Innovations in education are of crucial importance because of the contribution education makes to the development of societies and the well-being of people. It is widely believed that a country's social and economic progress depends on the quality of the education provided to its citizens. Unfortunately, research shows that around the globe the actual pace of educational innovations and their implementation is slow as shown by the lack of improvement in student learning outcomes (OECD, 2016). Today, the need for educational innovations has become acute (Serdyukov, 2017) because of the complexity, uncertainty, scale and pace of change of the present and future world (Carneiro, 2007); students and markets disenchantment with the nature, form and outcome of formal education as evidenced in increasing youth disengagement and high dropout rates (Conole & Creator cited in McLaughlin & Lee, 2010); existing and expected skill shortages in the global labour market (Scott, Sept. 2015); the availability of new media and other learning tools that allow for choice, self-direction and engagement in relevant learning task; and governments' disappointment with lack of productivity and efficiency in school education (OECD, 2016).

A review of the literature indicates a general agreement among international organizations, government agencies, corporations and educational researchers that the way to improve education quality that will contribute to productivity, growth and well-being, is by developing young people with 21st century skills that include critical thinking, creativity, collaboration, communication, cultural intelligence, citizenship, character qualities and

connectivity for learning (Wagner 2010, The Assessment and Teaching of 21st Century Skills Project (ACT21S)2; The US based partnership for 21st century skills (P21) 2007a, 2011, 2013; Sternberg & Subotnik 2006; and Michael Fullan 2013). The need for these skills is also well supported by research on innovation in the workplace (Avvisati, Jacotin & Vincent -Lancrin, 2013). The literature suggests these skills can best be developed through changes in curricula, use of facilitative pedagogies, assessments that focus on learning and the use of digital technologies that have the potential to enhance student learning outcomes.

The University of Central Asia's Education Improvement Programme (UCA-EIP) aims to improve the quality of the learning outcomes in STEM, ICT and English and develop the 21st century skills of the students graduating from 20 secondary schools located largely in secondary towns and villages of Kyrgyzstan. Students will be prepared to enter high-quality universities, be work ready and equipped for citizenship. To achieve its aims UCA-EIP will facilitate the professional development of teachers, methodological heads and school leaders and develop teaching and learning materials to deliver the outcomes. In time, these schools will become 'Resource schools' creating a pathway to improvement of neighbouring schools. UCA-EIP will also develop partnerships with universities and institutes of professional development to create synergies for sustainable systemic educational development. In so doing it seeks to contribute to improving the social and economic development and well-being of the people of Kyrgyzstan.

UCA-EIP will implement research-based best practices and will research its interventions and share results to inform policy and practice and in time develop a practical, sustainable and replicable model for education improvement in schools. As a first step, it has conducted this situational analysis in all the 20 selected schools in Kyrgyzstan to identify their strengths and assess their needs.

The Research Methodology

Research design

This situation analysis utilized mixed methods research design. Qualitative data was collected to obtain detailed insights pertaining to the behaviours and opinions of the participants (Savenye & Robinson, 1996), as well as to reflect multiple realities representing the different stakeholders' perspectives. The qualitative data provided the context where the data were collected, which is critical in providing understanding of the phenomenon being investigated (McMillan, 2008). Moreover, quantitative data was collected to understand trends, patterns, and magnitude of the phenomenon under study, as well as ensure the results are generalizable to a larger population. Additionally, curricula and textbooks used in the schools were analyzed and teaching and learning processes were observed.

The data for this research was collected from all the key stakeholders who have an interest in improving teaching and learning in secondary schools: students, teachers, school directors, members of parent committees and the board of trustees from the 20 schools. The qualitative data was obtained through interviews with school personnel and community members, student focus groups, observations of teaching and learning in the classroom, and the analysis of curricula and textbooks in the country. The quantitative data was collected through a student questionnaire, a teacher questionnaire, a school administrators' questionnaire, as well

as tests of knowledge and skills of students (NASEA and University Entrance Test (ORT)) and teachers (National Testing Centre).

Figure 1: Location of participating schools in Kyrgyzstan

Prior to the field data collection, a thorough review of available literature on the education system in Kyrgyzstan (e.g., government documents, education project reports, research results) was undertaken to identify the divergence between the current and desired situation and to identify challenges, opportunities and new directions. A review of the literature on 21st century education was also undertaken to delineate the motivations for educational change, the competencies required by high school graduates for success in work, life, and citizenship, the pedagogies, assessment practices and digital technologies required to facilitate teaching, learning, and assessment. The literature review provided a good understanding of the broad education context.

The research objectives

The primary objectives of the research were to:

- Identify the gaps between the current and desired state of teaching and learning in secondary schools in Kyrgyzstan to effectively develop students' curricula and 21st century skills;

- Identify what needs to be done and the strategies to close the gap;

- Identify best practices in teaching and learning that can be shared with other schools;

- Facilitate the development of an education improvement plan for each school; and

- Have a baseline from which to assess the impact of the programme at various end lines.

Key questions that guided the research included:

- What are the current teaching and learning practices in the sciences, mathematics, English, and informatics?

- What are the curricula learning outcomes in the sciences, mathematics, English, and informatics and how well do they support the development of curricula and 21st century skills?

- How do students perceive teaching and learning and what do they think would facilitate improvement?

- What is the nature of the administrative support provided for teaching and learning in the schools?

- What roles do the school Board of Trustees BOT) and Parents Committees (PC) play in supporting school improvement?

- What are the strengths, weaknesses, opportunities, and threats and what needs to be done to improve teaching and learning for the 21st century?

The population surveyed

In negotiations with the MoES for selection of the 20 schools for the UCA-EIP, a request was made that in selecting the schools two preconditions be met. Firstly, the secondary school should have teachers available in all subjects. Secondly, the school should have computers with internet access. The MoES provided a list of 38 schools, from which 20 schools were selected from a few oblasts. In meetings to finalize the list the MoES indicated that schools should be from all the seven oblasts of Kyrgyzstan and schools from Bishkek be reduced. Schools not on the original list were also identified for inclusion. Thus, the final list of the participating schools is from across the seven oblasts of the country including Bishkek and Osh and includes secondary schools in 6 villages, 9 towns and 5 cities.

A total of 112 teachers (Batken 15, Chui, 11, Issyk Kul 10, Jalalabad 13, Naryn 21, Osh 23, Talas 13 and Bishkek 6) completed the teacher general and subject specific questionnaires and a total of 108 lessons were observed. 382 students (72 grade 7, 88 grade 8, 86 grade 9, 67 grade 10 and 69 grade 11 students)[1], 240 female and 142 male completed student questionnaire and 138 participated in the focus group discussions (FGDs). From each school, the school director or deputy director filled in the school questionnaire. Key informant interviews (KIIs) were conducted with the director, a deputy director, a methodological head, the head of a Parent Committee and the head of the Board of Trustees. Focus groups discussions were also held with a group of 6-9 parents in each school.

Developing the tools and collecting the data

Based on the above-mentioned objectives and questions, the programme team developed research instruments. The data from the literature review on education in Kyrgyzstan and standardized tools such as the TALIS (OECD, 2014 sections of the teacher questionnaire) and PISA (2015) (sections of the school and student questionnaires) were used to develop

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[1] For ICT the total number of students was 242 (not 382), because currently there are no ICT classes for grades 10 and 11 students in the country and the majority of grade 10 and 11 students left the ICT questions blank. Those answers which were provided were discarded during analyses.

the research instruments for this study. The research instruments were sent to several academics and education specialists within and outside the country for validation.

The instruments include a school questionnaire, questionnaires for students and teachers (including a general questionnaire for all teachers and a subject specific questionnaire for teachers of the sciences, informatics, mathematics and English language) and semi-structured interview questions to conduct KIIs and FGDs. All the instruments were initially developed in English and then translated into Russian and Kyrgyz. To ensure quality of the translation the team used a back-translation technique.

Prior to the data collection, the tools were pilot tested in two schools: a city school and a village school. Pilot testing helped identify if the desired level of data would be collected from the questions asked, if the questions were clear to the targeted audiences and if not, what changes had to be made to clarify the questions and/or what follow up questions had to be asked.

Based on the pilot test results, as well as the feedback, suggestions, and recommendations from all the academics, education specialists, and the teachers who were involved in the pilot test, the team made the necessary modifications and finalized the data collection tools.

Validity (measure what the instrument is designed to measure) of the instruments were endorsed by the academics and education specialists. The reliability coefficients (consistency of the instruments) of the student questionnaire, teacher questionnaire, and school questionnaire were .977, .653, and .436, respectively. A variety of the research tools were used for triangulation of the data which in turn contributes to checking validity of the data.

To select student participants, a multistage, random sampling technique was used for most of the participating schools. In each participating school, 16-22 students were randomly selected from grades 7-11. A random sampling technique was used to identify every Nth (10th in most cases) student from each grade based on the total number of students. For the schools that had smaller numbers of students, a purposive sampling technique was used.

Self-administered questionnaires were given to the participants for the quantitative part of this situational analysis. However, staff were there ready to help the participants whenever they needed any support in understanding the questions and their logic and sequence.

The KIIs and FGDs were recorded and later transcribed in the programme office.

After the data was collected, a data cleaning process was conducted. The data clean-up was conducted in two phases. In the first phase it was done on the printed questionnaire when every questionnaire was examined, problems identified and resolved (e.g., responses of some grade 10 and 11 students who did not have informatics classes, but who answered the questions regarding this subject) and some missed questions discarded. The data was then entered into google forms. From google forms the data was transferred to excel sheets and the second phase of data clean-up started. In this phase the entered data was prepared for analysis in SPSS statistical software. All the output tables of the data analysis were produced by the SPSS statistical software.

Limitations of the study

One of the key shortcomings of the schools' needs assessment was that some of the data collection coincided with the end of the academic year, when the teachers were in the process

of preparing students for the end-of-the-year examinations. This especially affected the classroom observations as in some of the lessons, the teachers having completed their curriculum were only taking tests and/or quizzes. This prevented the data collection team from observing the teaching and learning in those lessons.

Collection of the students' socio-economic status (SES) data was included in the student questionnaire as research has shown that SES might have a direct or indirect impact on student learning outcomes. However, due to the age of the students, the findings from some of the questions should be interpreted with some caution as the students may not have the necessary knowledge to answer these questions accurately.

Many of the results are based on self-reports from students, teachers and school directors and therefore represent their perceptions, beliefs, practices and attitudes. While this is very useful information in and of itself because it provides insight into how students, teachers and school leaders perceive the environments in which they work, what motivates them and how their work is affected by policies, this information is subjective. To address this limitation and obtain more objective information and get a better understanding of how teaching and learning occurred in the subjects, observation of teaching was carried out.

Organization of the report

The report presents the analysis, results and policy and practice recommendations that have emerged from the situational analysis in the 20 secondary schools in Kyrgyzstan.

Section I: Overview of the study. This section presented a brief context and education background of Kyrgyzstan. It also presented the research methodology.

Section II: Profile and context of the school. It presents a description of the schools and the characteristics of the teacher, students and school directors. In doing so, it provides the context for the sections that follow.

Section III: The state standards and curriculum. The state standards for education and curriculum developed for the sciences, mathematics, ICT and English are presented. It describes the goals and objectives of education and key competencies to be developed through teaching and learning. It also delineates the goals and objectives, learning outcomes by competencies, content and assessment of subjects (STEM, ICT and English) of interest in this study.

Section IV: Teaching. It includes an assessment of teachers' knowledge from a test conducted by the National Testing Centre in Naryn oblast in 2011, teacher's self-reports of their beliefs, practices and attitudes as well as observations of teaching and learning in their classrooms. It also discusses the factors that support and hinder teaching and learning in the schools and teacher self-efficacy and job satisfaction.

Section V: Student learning: This section presents an analysis of student learning based on national assessments of students' knowledge, students' engagement in the classroom, their motivation to learn, and their educational and careers expectations. The factors that support and hinder students learning are also discussed.

Section VI: Student well-being. It discusses students' well-being through looking at how they live their lives at home and at school. More specifically, their relationships with peers,

teachers and family, as well as the influence of their school and home environment on their well-being.

Section VII: The school leadership. This section presents a profile of the school directors and the work they do to determine school goals and plan programmes to realize them as well as how they provide direction and support to teachers.

Section VIII: Developing and supporting teachers. The school's support for teacher professional development to improve teaching and learning, teachers need for professional development, and how best these needs might be met is the focus of this section.

Section IX: Improving teaching and learning using appraisal and feedback. The process and impact of teacher appraisal and feedback is discussed. It also discusses the outcomes both in terms of appraisal for teacher development and evaluation.

Section X: Parental Involvement in School. This section focuses on parents' support for teaching and learning and parents' contribution to the governance and functioning of the school.

Section XI: Conclusion. It delineates the strengths, challenges, opportunities and threats schools face in providing quality education and encourages policy makers and practitioners to act on the recommendations made throughout this report.

Section II: PROFILE AND CONTEXT OF THE SCHOOL

Introduction

This section is divided into two parts. The first part provides a profile of the schools by presenting background information on the schools as well as information about the schools' resources, school climate and school autonomy. The second part proffers the demographic characteristics of the school directors, teachers and students at the schools thereby providing a picture of the personnel who work and the students who study in them. Thus, this section sets the scene for the rest of the report.

Profile of the Schools

This part presents school background information, more specifically the school type and composition, the resources available, the quality of the school climate and level of autonomy at the schools.

School type and composition

Schools in Kyrgyzstan vary in terms of their location (urban, semi-urban or rural), ownership (private or public), language of instruction (Kyrgyz, Russian, Uzbek or Kyrgyz and Russian), number of shifts (one to three), student population and student characteristics.

The 20 schools from which data has been collected are located in 6 villages, 9 towns and 5 cities across all seven oblasts of Kyrgyzstan as well as from Bishkek and Osh. All the schools are state owned and operated. Fifteen of the schools compete with one or two other schools in the neighbourhood for students. The medium of instruction in ten schools is Kyrgyz, in six schools is Russian and in four schools is Kyrgyz and Russian.

All the schools, with one exception (a boarding school for students of grades 8-11), have both primary and secondary sections (grades 1-11) and nine have a pre-school section as well. Seventeen of the schools operate in two-shifts, two schools in one-shift and one school in three-shifts. The schools are open six days a week[2]. Two-shift schools operate in about five-hour shifts. There are both small and large schools; the smallest school has only 337 students and the largest school has 2,000 students. The average number of students in the schools are 1,136 and the average class size is 20.

On average there are slightly fewer boys (562) than girls (574) in each school. 97% of the students start and finish their education in the same school. Students move through the school without repetition of grades. The school directors estimate that on average there are about 1% of special needs students, 3% from disadvantage socio-economic backgrounds and 4% from marginalized communities studying in their schools.

School resources

In this study school resources include both human resources such as qualified teaching staff as well as material resources such as instructional equipment and materials.

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[2] From the academic year 2018-2019 the government has announced a five-day school week.

97.3% of teachers in the schools have a higher education diploma, the qualification required to teach in school. Most of the teachers are also qualified to teach their subject, but there are some teachers teaching subjects they are not qualified to teach.

Lack of qualified teaching staff is a concerning issue in about 25% of the schools. Vacant teacher positions averaged two per school for the year 2017-2018. According to the school directors, 40% of the vacancies were filled by hiring qualified teachers. The remaining 60% were filled by hiring less unqualified teachers, having teachers of other subject teach the courses, cancelling planned courses or adding a course to the same subject teacher's existing course load. 35% of school directors report it is difficult to hire qualified teachers, especially in the sciences. When vacancies occurred, school directors found it difficult to recruit teachers of physics (35%), mathematics (30%), chemistry (30%), and informatics (21%). English teachers were the least difficult to recruit (6%). 35% of schools having difficulty recruiting science teachers is an alarming sign. Without qualified teachers, teaching and student learning suffers.

94% of schools are housed in purpose-built buildings with adequate lighting and heating systems. 83% have enough classrooms (as per the number of shifts). All the classrooms are clean and well-ventilated. There is a staffroom in 95% of the schools. The schools have science laboratories (physics 80%, chemistry 80% and biology 70%). However, the equipment in the science laboratories is largely outdated and in disrepair and those in working order are insufficient. Materials for experiments are largely unavailable. 74% of schools have computer labs with internet access. On average there are 14 computers, with 9 connected to the internet and 2 interactive boards, 3 multimedia projectors and 7 digital screens in each school. The lack of up-to-date and sufficient equipment and materials is a real concern as without them teaching will remain at a theoretical level or information dissemination, with no chance for actual application of knowledge.

School climate

School climate or quality of school life includes factors such as safety and well-being (e.g., bullying, violence, verbal or physical abuse by teachers or students); punctuality and regularity of teachers and students; cheating; criminal behaviour (e.g., vandalism or drug and alcohol possession or use); and discrimination. It also includes the overall culture of the school in terms of the quality of the relationships among teachers, between teachers and students and the levels of respect and co-operation that are present.

Research shows that school climate influences many aspects of the learning environment, affecting both students and teachers in a school. A positive school climate has been shown to be related to student academic achievement at all levels of schooling (MacNeil, Prater and Busch, 2009; Sherblom, Marshall and Sherblom, 2006; Stewart, 2008). Cooperative and respectful teacher-student relationships not only have a positive effect on teaching and learning but are also known to prevent bullying or violence in a school (Eliot et al., 2010) and motivate students to learn (Eccles et al., 1993). A positive school climate has also been shown to be related to teachers' confidence that they can influence student learning (Hoy and Woolfolk, 1993) and to aid in teacher retention (Weiss, 1999).

Students were asked to report about the attitude and behaviour of their peers towards them over the last 12 months by responding to statements using the options '*once a week or more*', *a few times a month*', *'a few times a year' and 'never or almost never'*. Most students report

they were '*never or almost never*' bullied or abused by their peers. 92% state other students never made fun of them at school. 97% claim they were never threatened by other students at school. 94% assert other students never took away or destroyed their belongings. 96% indicate they never got hit or pushed by other students at school. And 80% say other students never spread nasty rumours about them.

The data shows there are very few serious infractions such as bullying or verbal or physical abuse by students at the sampled schools. In addition, there is a relationship of respect and cooperation among and between all school groups: the school directors, teachers, students and the parent community. Most of the students (85% and above) had very positive perceptions about their school and their relationships with their teachers and peers. 96% of the students report they like to go to school, 86% their teachers like them and 89% their peers like them. Moreover, this phenomenon was noted by the researchers when they were observing lessons at the schools and was reiterated in the focus group discussions with students and parents.

The one factor included in school climate that is likely to have a negative affect is class cancellations and interruptions, and absenteeism and late arrivals for classes by teachers and students. Students were asked to report the frequency with which school was closed, some classes were cancelled, a teacher missed the class, a teacher was called for a meeting and left the class, a teacher came late for class and a teacher did personal work during class over the last two full weeks of school. 18% of students report the whole school was closed, 41% some classes were cancelled, and 26% a teacher missed class. With respect to interruptions during class, 53% of the students' state teachers were called for meetings and left the class, 33% teachers came late for class and 33% teachers did personal work during the class. Students were also asked to indicate the frequency with which they missed school, missed classes or arrived late for school over the last two full weeks of school. 23% of students report they missed school, 26% they missed classes and 30% they arrived late for school one to two times during the last two weeks. Such high levels of class interruptions, teacher and student absenteeism and tardiness are likely to have a negative effect on the quality of teaching and learning.

School autonomy

School autonomy is the decision-making power that the school has as opposed to that of the local and national government. Autonomy is generally shared among the national, regional (oblast) and district education departments and the school. The research shows that different kinds and levels of autonomy can have an impact on student achievement. Some studies emphasize autonomy in curriculum and assessment decisions (OECD, 2010 cited in OECD 2014) while others stress the decision-making role of the school leader especially if their decisions are supported (Pont, Nusche & Moorman, 2008).

The schools in this study have autonomy in some areas but not in others. Decisions regarding the curriculum, textbooks and assessment lie with the MoES. The curriculum and textbooks are developed and approved for use in schools by the MoES. Schools can choose textbooks from among those approved by the MoES. The decision regarding subjects to be offered and the determination of subject content is shared between the MoES (State component), the school (elective component), students and their parents (school component). The MoES does however, have a major role with schools having a much smaller role.

Grades	State Component (%)	School Component (%)	Elective Component (Choice of subjects) (%)
1-7	95	5	-
8-9	90	10	-
10-11	85	10	5

Table 1: Distribution of study time to state, school and elective components within a weekly learning load (SSE 2014:17)

In the case of teaching staff, the schools have autonomy with respect to hiring and firing teachers but not in determining their starting salary or salary increases which are decided by the MoES. Although the school has the power to fire teachers, school directors are reluctant to do so even when there is evidence of sustained poor performance. The fact that it is difficult to recruit qualified teachers may be a reason for their reluctance.

The school has autonomy in deciding most school policies. In schools that have a BoT, it has the power to make school policies, which is shared with the school director and teachers. The school directors report power is shared in the following ratio in making school policies: admission policy (BoT 63%, director 25%), discipline policy (BoT 70%, director 20%, teacher 10%), assessment policy (BoT 57%, director 17%, teacher 17%), and homework policy (BoT 23%, director 4%, teacher 73%). The BoT, school directors and teachers also share responsibility with respect to building relations with the parents (teachers 53%, BoT 33%, director 11%) and the larger community (director 37%, BoT 30%, teachers 22%).

With respect to the school budget, the school directors indicate a shared role of the MoES, the district education department, and the school in its formulation. They report 97.9% of the school budget comes from the government which the schools must use as per budget allocations. The schools themselves raise 2.1% from other sources such as parents' contributions and donations. The BoT or PC (where a BoT has not been set up) are responsible for the collection and disbursement of these monies, based on needs identified by the school directors.

The people who work in the schools

The school directors

The school management comprises of the school director who is responsible for the administration of the school. The director is generally supported by three deputy directors, with responsibility for the curricular programme, the co-curricular programme and student discipline, respectively.

The teachers

Teachers were asked to provide some demographic data such as their age, gender, education, work experience and current employment status. On average there are four methodological heads[3], 35 teachers (grades 7-11) and three support staff in each school.

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[3] Teachers with additional responsibility for improving the quality of teaching.

Gender and age

Kyrgyzstan has an overwhelmingly female teaching population with 95.5% female teachers and only 4.5% male teachers. A gender imbalance in the teaching profession is of concern as it can impact student achievement and motivation and affect teacher recruitment and retention. Research shows that teachers' gender has no impact on student performance (Antecol, Eren and Ozbeklik, 2012; Holmlund and Sund, 2008) but there is some evidence that female teachers' attitude towards subjects such as mathematics can impact female student achievement (Beilock et.al. 2010).

The percentage of teachers that fall into the various age groups are as follows: 3.6% of teachers are under 25 years, 7.1% are between 25-29 years, 29.5% between 30-39 years, 14.3% are between 40-49 years, 35.7% are between 50-59 years and 9.5% are over 60 years. The data shows that 45.2% of teachers are 50 years and older indicating that a high proportion of teachers are approaching retirement or are past retirement age. The low number of young teachers, only 10.7% under 30 years indicates the lack of young teachers entering the profession and/or attrition in the first few years of teaching. The data implies that Kyrgyzstan is going to face grave challenges with respect to teachers in the near future as much of the teaching workforce is ageing and it is unable to recruit and/or retain enough young teachers in the profession.

Education and professional training,

97.3% of teachers have a higher education diploma, the qualification required to teach in Kyrgyzstan. 1.8% have a master's degree and 0.9% a secondary school certificate, not qualifying them to teach. The higher education diploma is a five-year university education programme (common in the ex-Soviet Republics). It included both acquisition of subject knowledge and pedagogy and practical experience necessary to qualify to teach in school. Since the collapse of the Soviet Union in 1991, the theoretical component continues but the practical component has largely been curtailed[4].

While most of the teachers are qualified to teach their subject, there are teachers who are teaching subjects they are not qualified to teach, and these are generally the STEM subjects.

Work experience

In addition to initial teacher training, the years of teaching experience can affect development of teachers' knowledge and skills and consequently student achievement. Research shows each year of experience is related to higher student achievement especially for teachers in their first five years in teaching (Harris and Sass, 2011). Research also shows that teachers with many years of service are more likely to be resistant to implementing reform, questioning their own professional capacity and expressing dissatisfaction with their students' and schools' future (Goodson, Moore and Hargreaves, 2006).

The teachers in this study have an average of 18 years of teaching experience. 9.8% have 1-5 years of experience, 19.6% have 6-10 years of experience, 8.0% have 11-15 years of

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[4] In compliance with the Bologna accord, since 2012-2013 higher education institutions in Kyrgyzstan have been transferring to a bachelor's and master's degree system with the exception for certain specialties.

experience, 12.5% have 16-20 years of experience and 50% have more than 20 years of experience.

In this study only 9.8% of teachers are in their first five years of teaching. It is important that these teachers are supported and mentored enabling them to have a rich and rewarding teaching experience which will impact student achievement and retain them as teachers. In this study 50% of the teachers have more than twenty years of teaching experience. This study did not look at the effects of teacher's tenure on implementation of reforms and innovation. Research is needed to find out how teachers who have long teaching tenures respond to the implementation of innovations and reforms.

The data shows that teachers tend to stay in the same school for many years. 22.3% have been teaching at their current school for 1-5 years, 20.5% have been teaching at the same school for 6-10 years, 14.3% for 11-15 years, 8.9% for 16-20 years, and 33.9% for more than 20 years. An overwhelming 77.7% of the teachers have been teaching at their present school for more than five years. Teachers staying at the same school for several years may have a positive effect on student achievement as research shows that teacher turnover harms student achievement (Ronfeldet, Loeb & Wyckoff 2012).

Employment status

Job security and job flexibility are important in attracting and retaining teachers to the profession. All the teachers in the study are permanently employed with 93.7% employed full-time and 6.3% employed part-time. Teachers are very secure in their jobs with school directors often unwilling to terminate them even when their appraisals indicate consistent poor performance.

The data shows that two-thirds of the teachers are on a 'one payment rate' and one-third are on a 'one and a half payment rate[5]. This shows that rather than choosing to work fewer hours, a third of teachers are working overtime. Most teachers who work for more than 'one payment rate' do so because of their low salaries. Low salaries and working overtime can be causative factors in the attrition of teachers, affecting student performance and achievement.

Key Findings and Recommendation for Policy and Practice

Key findings

- Nearly all the teachers (95.5%) are female.

- There is likely to be a shortage of teachers as many teachers who are currently teaching in the schools are at retirement or already post retirement, and only few young people are joining and staying in the profession.

- Schools are finding it difficult to hire qualified teachers especially in physics, mathematics and chemistry.

- Most schools are purpose-built but they do not have enough classrooms, so they must operate in two- and three-shifts. The schools have science laboratories but

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[5] One-payment rate (stavka) - the amount of salary paid to a teacher for 18-20 hours of teaching per week. Since the academic year 2018-2019 the directive from MoES is for teachers to be allowed only one payment rate.

there is a chronic shortage of science equipment and materials necessary for conducting science experiments.

- There is a significant shortage of ICT infrastructure and equipment with an average of 14 computers per school and only 9 with internet access.

- Most students' and teachers' study and work in a positive school environment. There are high levels of respect and cooperation among and between all school groups: the school directors, teachers, students and parents.

- School climate is affected by far too many class cancellations and interruptions to the teaching and learning process by teachers being called away as well as by absenteeism and late arrivals for classes by teachers and students.

- Autonomy is shared with the MoES, the oblast, district education departments and schools. The MoES determines curriculum, assessment and teacher salaries. The school directors make decisions regarding hiring and firing teachers and with the BOT and teachers make school policies.

Recommendations for policy and practice

Provide adequate infrastructure and material resources for ICT and the sciences

It is positive that the schools have computer and science laboratories, however, it is imperative to provide up-to-date and sufficient resources such as science equipment and materials to facilitate practical investigation of scientific phenomena. Given the importance of ICT it is crucial that computers with internet access are sufficient and easily available to develop students' ICT skills and facilitate technology-embedded teaching and learning in the schools.

Prevent the interruption of learning

Ensure schools are not closed except in extenuating circumstances. The school administration should schedule teacher meetings and assign teachers duties in a way that avoids a negative impact on student learning. In addition, make teachers' regularity a criterion for assessment of their performance. Furthermore, educate parents about the importance of ensuring their children are in school every day.

Provide greater autonomy and support to schools

Provide greater autonomy to schools in areas that will increase student achievement such as in curriculum and assessment decisions. This will require the professional development of school staff in these areas.

Improve teacher remuneration and benefits to attract and retain teachers

A governmental review of benefits - both monetary and non-monetary – and working conditions of teachers is urgently required to attract and retain them. A career ladder for teachers with increased job responsibilities and benefits at each rung of the ladder is also immediately needed to retain teachers in the profession.

Attract professionals with science and mathematics backgrounds to teaching

Professionals with science and mathematics backgrounds should be recruited to teach in schools and a programme that is clearly targeted at developing their teaching skills should be provided to prepare them to teach.

Section III: THE NATIONAL STANDARDS AND CURRICULUM

Introduction

The national standards movement which began in the United States in the late 1990s was born out of frustration with differences in the learning outcomes of different groups of students and the number of children living in poverty or from minority communities failing to achieve. The national standards movement has since gone global. National standards are important because they serve as guideposts for schools, identifying what students should be learning at each grade and in each subject. The standards are the basis for curriculum and textbook development, teacher professional development, teaching and learning in schools, and national assessments of student learning. The standards are also seen as a way for countries to help raise student achievement to international levels. However, critics have pointed to the need to be cautious as the 'one size fits all' standards may limit students' creativity and innovation.

This section introduces the national standards for Kyrgyzstan and how they are interpreted in the curriculum for mathematics, the sciences, English and ICT. It seeks to identify what students should be learning and how this learning would prepare them for life in the 21st century.

The State Standards

Kyrgyzstan approved the State Standards for Education (SSE) in 2014. The SSE outlines the goals, objectives and results of general school education. It also provides the requirements for the structure of the subject standards, the learning process and the assessment system.

Goals and objectives of education

The goals and objectives of education include the acquisition of core subject knowledge (age-based); citizenship education to develop a civic culture, tolerance and ability to defend one's rights; communicative competence, character qualities such as independence, initiative and responsibility; cultural diversity; and competence in the use of digital technologies for education and work. The goals and objectives are to be realized in an education system which promotes equity and social inclusion by providing all children equal rights to education (MoES, 2014 p. 5).

Key competencies to be developed through teaching and learning

Three key competencies central to the enquiry process are identified. 1) Information competence entails learning through searching for, gathering and processing information to make decisions. 2) Social and communicative competence to understands one's own interests and values and that of other people and social groups to resolve 'personal, social and professional problems'. 3) Self-organization and problem-solving competence to identify contradictions in information, learning and life situations and address them using a variety of methods, independently or collaboratively (Ibid, p. 6).

Three levels of achievement of the key competencies are identified and an example of the attainment of each competence at each of the three levels is provided. Level one, reproductive, is the ability to follow a given algorithm; level two, productive, is the ability to

apply the given algorithm in other situations; and level three, creative, is the ability to engage in complex and creative activities. All students at each level of education must demonstrate acquisition of the competencies as per their age, individual characteristics and educational conditions. The lack of an example of what the achievement of the competencies would look like at each education level (e.g., primary, lower secondary and upper secondary) is a limitation.

Curricula areas

The SSE identifies the aims of seven educational fields: language, social, mathematical, natural-science, technological, art, and culture of health. The aim of the study of 'languages' is to develop the speech, language (four skills) and socio-cultural competencies of students through their native (first), state/official (second) and a foreign language. The aim of the 'social' educational field is the formation and development of personal, civil and social competencies to enable students to play an effective role in society. The study of 'mathematics' facilitates acquisition of the language of mathematics, logical operations and the skills of problem solving needed for studying and describing natural and social phenomena and their interrelationships. The aim of the study of the 'natural-science' is to develop the recognition and formulation of scientific questions, the scientific explanation of phenomena and the use of scientific evidence through the study of the individual subjects and integrated courses to understand natural and human communities and their interdependence and the need for sustainable development. The aim of the study of 'technology' is to develop information communication technology (ICT) skills for learning, work and citizenship. The 'arts' will develop students' social, emotional and creative self-expression through engagement in artistic activities, as well as enable understanding of one's own cultural identity and the value of cultural diversity. And 'culture of health' aims at acquisition of the skills of preserving and improving the physical, emotional and social health of self and others (Ibid, p.15-16). However, rather than continuing with this integrated approach by identifying standards for each educational field, the SSE immediately returns to the old and familiar by identifying the requirements for the standards and curriculum for each of the subjects that currently form the school curriculum.

The SSE stipulates that the standards and curriculum for each subject must be based on the state standards. It must include general provisions such as the system of basic normative documents for general education institutions and definitions of key terms, the goals and objectives, subject competencies, relationship between the three key competencies in the SSE and subject competencies, distribution of content by grades, cross-curriculum links, the expected learning outcomes of the students (levels and grades) and strategies for assessment of students' achievement. It must also provide the requirements for the organization of the educational process including the minimum resource requirements to facilitate implementation of the subject standards and creation of a motivating learning environment (Ibid, p.18-19).

The SSE emphasizes making connections between and ensuring consistency across the subjects. It specifies the maximum weekly learning load for each grade and the approximate distribution of study time between state (subject for all students), school (subjects identified by the school and offered with consent of students and parents) and elective components (subjects chosen by the school and supported by the Republican budget) within the weekly

learning load. The SSE also encourages the use of active and interactive learning pedagogies, individual and collaborative learning, and the use of ICT to facilitate independent learning and achievement of the learning outcomes and competencies. Among the pedagogies, the SSE singles out project work 'used to solve a problem, which is significant for a student, a school, a community... implemented in individual, pair, [or] group forms for a certain period' (Ibid, p.18-19). It also supports the conduct of projects across age groups. Project work is emphasized because it allows students to acquire the skills of independently constructing knowledge, using various kinds of information and develops cognitive skills and social competence.

Three types of assessment (diagnostic, formative and summative) are described; aimed at identifying progress in and achievement of learning outcomes. It encourages the use of quantitative, qualitative and descriptive methods (portfolios, observation of individual and group work and presentations) not only by the teacher but by the students themselves and their peers to develop skills of critical assessment of performance.

Preparation of teachers for new roles

The SSE does well to recognize that the new standards and the transition to a competence-based education requires a change in the role and functions of teachers. It proposes the development of new standards and programmes for initial and continuing teacher professional development.

Assuring quality education

The SSE identifies a system for assuring education quality which includes assessment of student achievement of learning outcomes through national assessments; an assessment of educational achievements of the school through internal and external monitoring and control; and monitoring and assessment of the education system through attestations of primary and secondary school graduates.

The SSE is clearly focused on helping students develop the 21st century competencies of communication, cultural intelligence, character qualities, critical thinking, connectedness for learning and citizenship. While creativity is the third level of achievement for the key competencies and is required by all students, in the description of the educational fields the development of creativity is limited only to the 'arts'. It would do well to encourage the development of creativity in the other educational fields as well. A severe criticism of education in Kyrgyzstan is an overloaded curriculum which could have been addressed by having students study the broader 'educational fields' rather than the discrete subjects within them. It would also have facilitated the attainment of the key competencies through the conduct of 'enquiry' and 'projects' which requires drawing on the content and processes of many disciplines to find solutions to the identified problems. The identification of standards requires the development of curricula, the provision of teaching and learning materials, and new assessment strategies. Most importantly it requires new professional standards and programmes for teacher professional development to facilitate students' attainment of the competencies identified in the SSE. This research report will contribute to assessing how well this has been done to-date.

Subject Curriculum: Foreign Languages (English)

Goals and objectives

The goal for foreign language study (English included) is to develop multilingual students with a multicultural mindset through acquisition of communicative competence in a foreign language. The educational objective is to acquire theoretical knowledge and practical application of English using the four language skills, understanding the culture of the country of the target language and developing students cognitive, communicative and emotional skills. The value-promoting objective is to develop a humanistic value system to facilitate effective communication in different cultural contexts.

Learning outcomes by competencies

In congruence with the three key competencies in the SSE, the three language competencies in the curriculum are: 1) Speech competency, to develop the four language skills and use language for communication. 2) Linguistic competency, to acquire new vocabulary and grammar in accordance with the topics, spheres and situations of communication given for each stage of education. 3) Sociocultural competency, to learn about the culture, traditions and general situation in the country of the target language by examining the topics, spheres and situations of interest to students at the different stages of school education.

The learning outcomes for each grade and for each competency (speech, linguistic and socio-cultural) are provided. However, the only difference between them is in the amount of time, number of words or sentences to be completed, that is in the quantity not the quality of the learning. For example, a learning outcome for grades 7 to 9 is 'comprehend a text in the foreign language through listening'. In grade 7 students will listen for 1.5 minutes, in grade 8 for 1.5-2 minutes and in grade 9 for 2 minutes. Similarly, for vocabulary the learning outcome is 'use vocabulary of 800 words in speech', 'use vocabulary of 900 words in speech' and 'use vocabulary of 1,000 words in speech' in grades 7, 8 and 9 respectively. In addition, there are far too many learning outcomes identified for grammar thus continuing to give grammar too much emphasis as an independent component of language learning rather than using a more integrated approach.

Content

The content to be covered for the subject for grades 6-11 is given under three main headings: 'day to day life', 'culture' and 'education and work'. The content to be covered under 'day to day life' includes for example, 'relations with family members and friends' for grades 6-7, and 'day-to-day life of a household, household's income, living conditions in rural and urban environment, for grades 10-11. The content under 'culture' includes, 'home country and the country of the target language, its location, climate, weather, capital cities and sights' for grades 6-7 and continues in grades 8-9 with 'their cultural characteristics: national holidays, important dates, traditions and customs'. The content for 'education and work' includes 'school and school life, school subjects and students' attitude' for grades 6-7 and continues with the 'selection of future profession and role of foreign languages' for grades 8-9.

In addition, twelve topics are given for discussion for grades 3-11 including famous people, family, school, daily life, sports and shopping. However, the content for each topic is only

provided for grades 6-10. Unfortunately, other than the content no activities to develop the four language skills are suggested.

Cross disciplinary connections of the foreign language with other subjects such as literature (short stories, biographies), sciences (working with texts about different concepts in sciences) and ICT (using technology to make presentations) is identified. This section appears to have been included to fulfill the requirements, rather than to promote interdisciplinary learning. For example, ICT should be completely integrated into language learning and be used to develop students' language skills rather than being signaled out only for presentations.

Assessment

A detailed section on assessment is provided which explains the purpose of assessment, the principles, and types of assessment: diagnostic, formative and summative as well as norm and criterion referenced assessment. Criteria for assessing the various language skills reading, listening comprehension, speaking (retelling, speech, discussion) and writing skills (mini-essay and letter) using the traditional 4-point grading system is given with the proviso that the level of difficulty of each should be according to the grade level[6.]

It is not clear for which grades the foreign language curriculum has been designed. Discussion topics are given for grades 3-11, content provided for grades 6-11 and learning outcomes identified for grades 7-11. Moreover, the learning outcomes are repetitive. There are too many for grammar and far too few for cross-curricular links. The assessment section would be greatly improved if examples of rubrics for assessing a language skill at each grade level had been provided.

Subject Curriculum – Information Communication Technology (ICT)

Goals and objectives

The main goals of the study of ICT is to acquaint students with the theoretical foundations of ICT and have them acquire practical skills in using ICT tools for studying and everyday life. The objectives are focused on acquisition of the skills to use ICT to independently plan, gather information, present, and evaluate the results. In addition, they are focused on developing students' understanding of information as an important strategic resource for the development of the individual and society in the modern world.

Learning outcomes by competency

Five competencies are identified in the ICT subject standard: 1) Information literacy including techniques of searching, receiving and presenting information in various forms. 2) Logical and algorithmic, aimed at developing the basics of logical and algorithmic thinking. 3) ICT basics to understand how to use computers and other ICT tools. 4) Modelling and design, to understand the requirements of technical aesthetics for industrial products and

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[6] The 4-point scale (2-5) grading system used in schools.
'5' (excellent) - the level of fulfillment of the requirements is much higher than satisfactory
'4' (good) - the level of fulfillment of the requirements is above satisfactory
'3' (satisfactory) - a sufficient minimum level of fulfillment of the requirements for a particular task
'2' (bad) - the level of fulfillment of requirements is below satisfactory. It is not a passing grade.

building and using information models of objects and reference systems. 5) Communication, to facilitate receipt and transfer of information.

A clear link between the three key competencies in the SSE and the five competencies for ICT in the curriculum are provided by indicating the learning outcomes to be achieved through the study of ICT at each level: reproductive, productive and creative.

Content

The content for ICT for grades 5-9 is given under four main content lines: information and information processes; computer; algorithms and programming; and information and communication technologies. These closely resemble the ICT competencies without the modelling and design competency. Topics to be studied under each content line are provided as are the number of hours to be given to their study. For example, the topics under 'information and information processes' for grade 5 is 'objects and systems' (6 hours) and 'information around us' (8 hours); for grade 7 it is 'information and information processes' (4 hours) and for grade 8 it is 'mathematical foundation of informatics' (8 hours). There are no topics for grade 6 under this heading (MoES, 2016 p.18).

Cross disciplinary connections of ICT with other subjects such as mathematics (reasoning and logical thinking), science (searching and processing information to learn more about the surrounding world) and languages (writing, speaking, thinking and communicating) are identified. Here too, similar to the curriculum for foreign languages, cross disciplinary connections are identified rather than integrated in the teaching and learning of all subjects.

Assessment

An assessment section similar to the foreign language subject standard is provided. Criteria for assessing oral tasks, practical work and tests on the 4-point scale is given in general and not according to the grade level. Too much of this section is focused on critiquing traditional assessment methods which could have been used to provide contemporary assessment exemplars at each grade level.

With the importance of ICT for study, work and life in the 21st century it is untenable for ICT to be taught to students only from grades 5-9. The ICT curriculum should be developed for students in primary school (grades 1-4) and continue at the upper secondary level (grades 10-11). The ICT curriculum has done well to focus on the development of both knowledge and practical skills. Some of the content such as a 'hexadecimal code' or 'programing as algorithmic' seems to be unrealistic for computer science literacy for students 15 years of age and under. Rather than simply suggesting cross-disciplinary connections, the curriculum would have done well to focus on the integration of ICT into the teaching and learning of the other disciplines providing some concrete examples, including how to assess them.

Subject Curricula – The Sciences

Goals and objectives

The goal for the sciences is the development of knowledge and understanding of scientific phenomena occurring in the world and the application of theoretical knowledge in practice. The cognitive objective is to describe the structure and principle of the functioning of living things and to explain physical and chemical phenomena. The behavioural objective is to

conduct scientific research and practical work. The value-promoting objective is to observe the principles of sustainable development and follow them in life.

Learning outcomes by competencies

Three subject competencies are identified in the science standards. 1) Identification and formulation of researchable scientific questions, to identify the basic characteristics (approaches, methods, tools) of natural science research, to interpret scientific facts and information and draw conclusions. 2) Scientific explanation of the phenomena, that is, to provide scientifically grounded descriptions or interpretations of phenomena, and forecast changes. 3) The application of scientific evidence, to interpret the scientific facts, data, evidence and draw conclusions; and to assess the consequences of the application of scientific achievements and technology in society.

There is a separate subject curriculum for each of the science subjects: physics, chemistry, biology, geography and astronomy[7]. In each subject, the learning outcomes are provided for each topic within each of the three subject-based competencies and their relationship to the key competencies in the SSE identified. A list of required resources, including equipment and chemicals to facilitate attainment of the learning outcomes is provided.

Content

The content for biology is given under 4 topics, 'organism, as a biological system', 'supra-organismal systems', 'diversity of organic world and evolution', and 'humans and the environment'. Physics content is provided under 5 topics, 'methods of gaining knowledge for science and educational purposes'; 'matter, its types, structure and properties'; 'movement and interaction'; 'energy'; and 'application of physics-related knowledge'. There are 4 main topics under which chemistry content is provided, 'methods of learning chemistry', 'substances', 'chemical reactions' and 'use of substances and chemical reactions in life'. The academic content for each topic grade wise is provided as is the competency, expected outcomes and outcomes to be achieved by the end of the year. The outcomes are largely focused on knowledge and comprehension even at the upper secondary level.

In comparison with the other subject standards, the curriculum for each science subject provides more specific and relevant cross-disciplinary connections.

Assessment

The assessment section is comparable to the other subject standards described above.

The science curriculum does well to focus not just on acquisition of knowledge and understanding but application of learning to real-world situations. The detailed specification of learning outcomes in each subject for each grade to be accomplished by the end of the year will facilitate teaching, learning and assessment of student performance. Given the abysmal state of science resources in schools, the curriculum does well to identify the science resources that are required to achieve the learning outcomes. But as this study shows schools are yet to implement the science curriculum and be provided the necessary resources.

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[7] Astronomy has as of the academic year 2018-2019 been integrated into physics

Subject Curriculum – Mathematics

Goals and objectives

Five general goals for mathematics are given in the curriculum which are: to acquire mathematical knowledge and skills required for life, study and work; develop general intellectual skills of students; develop mathematical skills such as logical thinking and reasoning; facilitate interest of students towards mathematics; and develop such character traits as independence, persistence and intellectual curiosity. These general goals are then categorized according to grade levels. The goal for grades 7-9 is to develop computation, algebraic and logical thinking skills and to prepare students for studying mathematics related disciplines. The goal for grades 10-11 is to learn rational, irrational, trigonometric expressions, exponential and logarithmic expressions, functions, equations, inequalities and their systems. The cognitive objective is to understand the logical pattern in mathematics, logical connections between different sections, and to use mathematical language as a tool for learning, research and communications. The behavioral objective is to use mathematical knowledge and skills to perform practical tasks and apply knowledge in real-life. The value-promoting objective is to acquire new skills (computation and logical thinking), conduct analysis and comprehend errors in mathematical measurements.

Learning outcomes under competencies

Four subject competencies are identified for mathematics: 1) Computational competence, to distinguish between numbers, to perform arithmetic and algebraic operations on numbers and to calculate numerical values of different mathematical expressions. 2) Analytical functional competence, to define the basic functions and expressions, know their properties, to perform arithmetic and algebraic operations with basic mathematical expressions and to solve equations, inequalities and their systems. 3) Visual-figurative competence, to know the basic geometric shapes and their elements, to use graphical representation of analytical expressions and to analyze phenomena from the surrounding reality. 4) Statistical-probabilistic competence, to understand deterministic and nondeterministic processes, distinguish them, to perform operations on sets, to know the basic properties of probability and to use them to solve problems associated with the surrounding reality.

The learning outcomes are provided for each topic within each competency. The mathematics curriculum provides the requirements for completion of the mathematics course, that is, what the students will be able to do by the end of grade 11 when they complete school. Rather than providing learning outcomes at grade 11, the mathematics curriculum would have done well to identify learning outcomes to be achieved at each grade, as is done in the science curriculum. Like science, a list of required mathematical manipulatives and resources for teaching and learning is provided, which are yet to be received by schools.

Content

The content for mathematics is given under the five topics: numbers and expressions; algebraic expressions and functions, equations and inequalities; geometric shapes and forms; and elements of statistics and probability theory. Topics are distributed according to these headings across grade levels. In addition, the description of how these mathematical topics can be applied in real-life is also provided.

Cross disciplinary connections of mathematics with other subjects are given in some detail focusing clearly on the application of the knowledge and skills developed in mathematics in the other disciplines, and vice versa.

Assessment

The assessment section is similar to that provided in the other subject standards described earlier.

Although required by the SSE, the mathematics curriculum is the only one that includes a section on the 'creation of a motivational learning environment'. This section encourages all stakeholders to ensure adequate 'material, organizational, physiological, pedagogical, [and] technological' factors to motivate students and ensure quality mathematics education to all.

The general goal and objectives of the mathematics curriculum are aimed at developing students' knowledge, logical thinking and reasoning skills and character traits such as intellectual curiosity important for students now and in the future. The learning outcomes and content, however, are clearly focused on knowledge acquisition and description of the application to real-life. Unfortunately, as this study shows teaching and learning of mathematics continues in the behaviourist rather than the constructivist paradigm envisioned in the curriculum.

Summary

The SSE aims to develop the 21st century competencies of students. It sets out the requirements for the subject curricula to ensure they are based on the SSE. It recognizes that in addition to development of curricula, new teaching and learning materials and assessment strategies are required. It also recognizes that successful implementation of a competence-based curricula will only be possible if new professional standards and new teacher professional development programmes are offered. Unfortunately, the curricula do not provide the learning outcomes at each grade level, and do not provide exemplars of 21st century pedagogies or assessment tools. Moreover, the curricula is subject based, includes too many topics and focuses on knowledge acquisition. It continues to reflect what Steiner-Khamsi et al., said of the previous curricula, 'The breadth of knowledge required is overwhelming as is the limited amount of time in which teachers have to cover it' (2007, p. 23). A complaint expressed by the science and mathematics teachers in this study which results in them focusing on curriculum coverage rather than student learning.

Key Findings and Policy and Practice Recommendations

Key findings

- The SSE outlines the goals, objectives and results of general school education which are clearly aimed at facilitating student development of the 21st century competencies and their application to real-world situations.

- The SSE identifies and describes seven curricula areas but rather than continuing with this integrated approach returns to the old and familiar by identifying the requirements for the curriculum of each school subject.

- The SSE identifies project work, enquiry and collaborative learning as key pedagogies to achieve the learning outcomes, but without any exemplars of how these pedagogies can be used in each subject to meet the learning outcomes, they are not likely to be implemented.

- The SSE recognizes the importance of developing professional standards for teachers and developing new initial and continuing teacher professional development programmes as per the standards, so teachers are developed to deliver the stated student learning outcomes.

- The curriculum of each subject reflects the key competencies outlined in the SSE and describes how they can be achieved through the curriculum. Similar to the SSE each subject curriculum emphasises the application of knowledge and skills for learning and life.

- Key limitations of the curricula are the absence of the learning outcomes for each grade level (except science), exemplars of 21st century pedagogies and learning activities, integration of ICT in the teaching and learning of each subject and assessments tools that could assess achievement of the learning outcomes.

- The ICT curriculum has been developed only for grades 5-9.

- The list of resources for teaching and learning the sciences and mathematics to ensure attainment of the learning outcomes is included in the curricula.

- The curricula, the first step to ensuring teaching and learning as per the standards, has been developed for each subject. However, as this study shows textbooks (only some developed, but even those have not reached all students), teaching and learning material, assessment and most importantly teacher professional development to facilitate attainment of these competencies is yet to be provided.

Policy and practice recommendations

Develop benchmarks for each level of schooling and learning outcomes grade wise for all subject curricula

Because competence-based standards aimed at developing students' competencies are an innovation in education it is imperative that benchmarks be identified for each level of schooling (grade 4, 9 and 11) and all the subject curricula clearly provide the student learning outcomes to be achieved at each grade level.

Develop exemplars of 21st century pedagogies, integration of ICT in all subject-curricula and assessments

To support teaching, learning and assessment of the competencies it is important to provide exemplars of 21st century pedagogies such as 'enquiry', 'project work', and 'cooperative learning', ways to embed technology into teaching and learning of all subjects and assessment tools clearly linked to assessing the whole range of learning outcomes.

Develop the ICT curriculum for grades 1-4 and 10-11

Develop the ICT curriculum for the primary school (grades 1-4) and for upper secondary school (grades 10-11) to develop students' ICT skills and facilitate their application for college, career and citizenship.

Develop professional development standards for teachers

Professional standards must be developed specifying what teachers should know, be able to do and the qualities of character they should have. These professional standards should serve as a framework for decisions regarding selection of teachers, guide their professional development and determine career advancement.

Develop and offer new initial teacher education programmes

New initial teacher education programmes be designed and delivered as per the professional standards to enable successful implementation of competence-based curricula.

Section IV: TEACHING IN SCHOOLS

Introduction

It is a widely accepted that schools are only as good as their teachers. It is also widely accepted that of all school related factors, teachers have the most influence on student learning (e.g., Darling-Hammond, 2000; Hattie, 2003; Konstantopoulos, 2006; RAND Cooperation, 2012). As such, it is important to understand the current teaching practices of teachers to develop realistic and relevant policies to improve their knowledge and skills and thus improve teaching and learning.

A total of 112 teachers in 7 oblasts, Bishkek and Osh in Kyrgyzstan were surveyed to give a representative profile[8] of the teachers. Teachers' demographics: age, gender ratio, education qualifications and years of teaching experience (see p. 14 above) as well as teachers' subject knowledge, teaching practice, education beliefs, their self-efficacy and job satisfaction is the focus of this section. A total of 108 lessons were observed to depict the teachers' actual teaching practice. Both quantitative and qualitative data were triangulated to give a more complete picture of teaching in schools. This section makes an important contribution to understanding the current state of teaching in Kyrgyzstan.

Teacher Knowledge

The report on the teachers' knowledge level is predicated on a computer-based teacher's test conducted by the government's National Testing Centre (NTC) in Naryn oblast in 2011. The purpose of the test was to identify the level of teachers' subject knowledge, evaluate the quality of teachers in schools and determine the professional development needs of teachers. 92 subject teachers in Naryn Oblast (Naryn city, Naryn district, At-Bashy district) took part in this test. The results showed that 57 teachers (62%) passed the test with a passing score of 60% and above whereas 35 teachers (38%) failed the test. Physics was the subject in which the teachers obtained the lowest maximum (55%) and minimum (17.5%) scores. There were great variations between the maximal and minimum scores of all the subject teachers (mathematics 97.5% and 45%; chemistry 80% and 25%; biology 88% and 32% and English 76.7% and 31.7%) which show that the teachers' subject knowledge varies considerably. Furthermore, the difference between the maximal and minimum scores in most subjects was more than 40%, which indicates a need for ensuring a sufficient level of subject knowledge of the teachers. Though the sample from only one oblast is not enough to generalize conclusively, with the data from the administrators indicating the difficulty in recruiting qualified teachers, especially physics and chemistry teachers (which agree with the data presented here), an effort in ensuring sufficient subject knowledge of teachers throughout Kyrgyzstan may be warranted.

Teaching practice (general)

The findings regarding the teaching practices in schools draws on three data sources, the teachers' self-reports (TR) on the frequency with which they use various teaching strategies in their lessons, the students' reports (SR) on the regularity with which teachers use various instructional activities in their science, mathematics, English and informatics lessons and the

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[8] At 95% confidence level and 10% margin of error (confidence interval)

qualitative data from the 108 lesson observations (LO) quantified to identify the frequency with which teachers use different activities in their lessons. Teachers responses of '*always and often*' to the statements have been added, the students reply to the statements '*in all lessons and in most lessons*' have been aggregated, and the observers reports of the teaching practices '*in all lessons*' have been triangulated and are presented below.

The teachers generally begin their lessons by checking whether students have completed their homework (LO 81.3%) and often use it to review what was learnt in the previous lesson (LO 62%, SR 71.9%). They then focus on the day's lesson. Most teachers have identified learning objectives in their lesson plans, but generally do not share them (LO 30.6%, SR 77.6%, TR 85%) with their students. They explain the new topic, sometimes building on what students already know (LO 46%, SR 70.2%).

The teachers use a variety of instructional activities during each lesson. The most frequent instructional activity is having students' complete textbook tasks (LO 57.4%, SR 73.7%, TR 88%) with teachers checking that students are working on the given tasks (LO 89.7%, SR 81.6%, TR 93%). Teachers do this to give students the opportunity to practice until they understand the subject matter (TR 81%). When giving students tasks, the teachers often give clear instructions (LO 50%, SR 74.9%) but less frequently explain to the students what is expected of them (SR 61%) or tell them in advance how their work will be judged (SR 66.7%). Nearly twice as frequently the teachers have students work on the tasks individually (LO 64.8%, SR 73.7%) than in small groups (LO 35.2%, SR 43.5%, TR 58%). When teachers do engage students in group work, few of the assigned tasks are challenging enough to require all students to collaborate (LO 19.4%). Furthermore, teachers seldom teach or have students use the processes that would ensure effective group work (LO 11.1%) or reflect on group performance (LO 14%).

The second most common instructional activity is the teacher asking and students answering questions (LO 36.1%, SR 74.4%, TR 74%). When using the instructional strategy of questioning teachers pose the questions more often to individual students than to the whole class. When they call on individual students to answer the questions it is to assess what they know (TR 74%). Students report that about three-fourths of the time the teachers give them enough time to think about the answers (SR 74.9%), however, lesson observations indicate only a few higher order questions require giving students wait time and providing feedback to their answers (LO 27.8% & LO 23.4% respectively). Both lesson observations and student reports indicate teachers often give clear answers to students' questions. However, while the lesson observations show teachers do this about half the time (LO 53.7%), students claim this happens over three-fourths of the time (SR 82.9%).

Students report the most frequent instructional strategy used in the lessons in all subjects is discussion (SR 78.9%). While, the lesson observations do not indicate any discussions where a topic is identified, and students present their views on the topic, they do show question and answer sessions that are a frequent occurrence in lessons in all subjects on occasion stimulating discussion. Teachers report they conduct debates where students can argue for an idea not their own (TR 61%). The conduct of formal debates was not observed in any lessons, but there were some lessons in which teachers required students to provide their own explanations with justification for their thinking (LO 26.2%) and to explore ideas before making decisions (LO 22.2%). Teachers asking questions, asking students to justify their

answers and explore ideas can probe and expand their thinking, facilitate processing of information and stimulate deeper learning.

It is good that the lecture is no longer the dominant instructional strategy in classrooms in Kyrgyzstan, but it is still often used (SR 53.8%) specially to explain new topics (TR 57%). However, the 21st century instructional strategy of project-based learning is the least exercised in Kyrgyz classrooms with only 38% of teachers reportedly engaging students in week-long projects. The use of ICT for teaching and learning is also seldom practiced in schools in Kyrgyzstan. While teachers report using ICT for projects or classwork in over two-thirds of their lessons (TR 69%), lesson observations indicate teachers used computers in only 16.8% of the lessons. Computers are generally used to display questions, activities or assessment items on digital screens or smartboards, simply replacing the traditional chalkboard. In a few cases pictures or videos are screened. The findings from the lesson observations are very similar to the reports of students who indicate that in their science, mathematics and English lessons computers were only used 15.8% of the time. In their informatics lessons students put the use of computers at 62%.

Teaching and learning in the 21st century also requires a greater participation of students in determining what and how to learn. However, while teachers report they ask students to suggest or help plan classroom activities (TR 48%), lesson observations found this was never the case.

The students indicate the teachers engage in formative assessment tracking their progress and designing activities to facilitate their learning (SR 72.5%) and work individually with them to help them learn (SR 62%). However, this was seldom observed in lessons and might be because only a lesson, not a series of lessons were observed. Students also report that teachers change the structure of the lesson if they do not understand the topic (SR 58.5%) and adapt the lesson to meet their needs (SR 55.4%). The teachers also indicate that they differentiate teaching for those who are having difficulty learning and those who are progressing faster (TR 81%). Neither changing lessons to facilitate understanding nor differentiating teaching for advanced and struggling students were observed. In all Kyrgyz classrooms, at the end of the lesson teachers give students marks using a 4-point scale (5,4,3,2). The students report that while teachers always give them a mark, it is less common for their teachers to discuss their performance with them (SR 46.6%), identify their strengths and areas for improvement (SR 56.9%) or tell them how to improve their performance (SR 56.6%). During the lesson observations, teachers were regularly observed giving students a mark at the end of each lesson but very rarely were they seen giving feedback and explaining what students could do to improve. This is a serious limitation of the system of formative assessment. It could be greatly improved if teachers share the criteria for assessing the tasks with students prior to the lesson and at the end of the lesson tell them how they performed based on the criteria and what they can do to improve. In addition, teachers should further develop their practice and have students engage more frequently in peer assessment (LO 12.7%) and self-assessment (LO 4.9%).

As mentioned earlier, the assessment of students at the end of each lesson by giving them a mark without feedback, identifying what they did well and how they could improve, becomes a summative assessment exercise rather than a formative one. In addition, quizzes and test are a regular feature in lessons (SR 70.9%). Tests are conducted more frequently in science

and mathematics lessons (SR 74.2%) than in English and informatics lessons (SR 67.7%) and a written test is often given at the end of each topic (TR 51%).

Students report the teacher generally summarizes what they have taught at the end of each lesson (SR 79.6%). However, lesson observations revealed that although there is time, lessons are not always summarized (LO 48.1%). At the end of nearly every lesson the teacher gives students homework for them to practice what they learnt (SR 91%); this practice was reflected in the lesson observations as well.

The teachers create a safe and respectful classroom environment. They use established procedures (LO 57.9%), show respect and sensitivity (LO 77.6%), and occasionally praise students (LO 37.4%). There was little or no disruption during the lesson's observation.

The data shows that teaching in schools in Kyrgyzstan continues to be teacher-centered with a focus on transmission of subject knowledge. Textbook-based, lower order thinking activities are the norm with students learning being largely memorization of content knowledge.

Resources to support teaching

A prevalent problem for the teachers of all subjects is the lack of teaching resources. Among which the shortage of textbooks, infrastructure and equipment for ICT and science laboratory equipment and materials are the most serious. All the teachers report most students in their classrooms do not have the textbook for their subject!
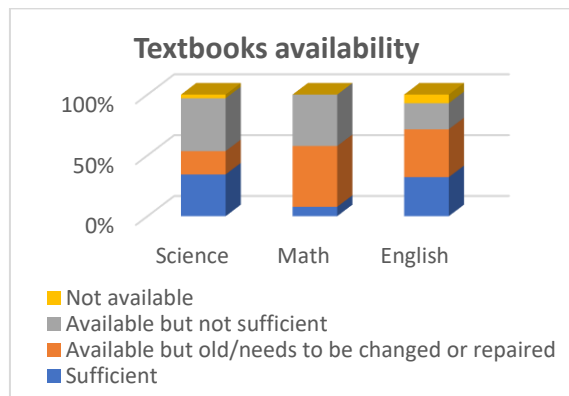
Figure 2: Availability of textbooks for each subject
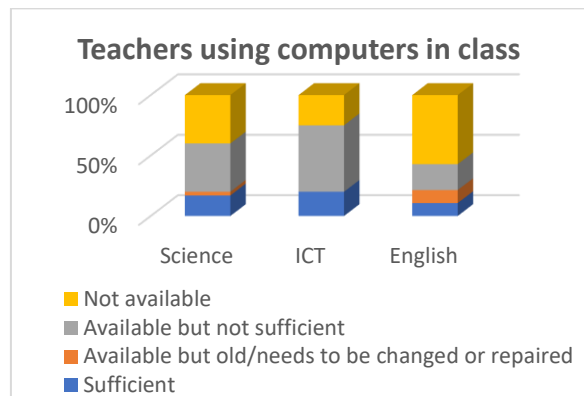
Figure 3: Teachers of each subjects using computers in class

The ICT infrastructure is inadequate in all schools. School do not have enough computers (41%), internet connectivity (47%) and educational software (35%). Only 20% of the teachers report sufficient computers available for them at their schools. Teachers in the remaining schools report either computers are insufficient (55%), too old (10%), or simply not available (15%). Only 31.4% of teachers use computers for teaching. There is also a lack of science laboratory equipment in 41% of the schools. Only 64.7% of school directors indicate that the science laboratories at their school are well equipped.

During the lesson observations teachers used the following resources. Textbooks (52.8%), worksheets (28.7%), computers (16.8%) with smartboards (13%) or digital screens (10.4%). All students did not have a textbook and students who did, had different editions. The smartboards and digital screens often simply replaced the traditional chalkboard but in a few cases are used to screen pictures and videos.

Without sufficient and up-to-date teaching resources, all teaching will remain at a theoretical level or limited to information dissemination, with no chance for development of skills and application of knowledge to real-world situations.

Teacher Beliefs about Teaching and Learning

The teachers hold (*strongly agree & agree*) both contemporary and traditional educational beliefs. With respect to the role of teachers and students in the classroom, teachers believe on the one hand that students should be allowed to find solutions to problems on their own (97%) but on the other hand believe that effective teachers demonstrate the best way to solve problems (94%). Similarly, while believing that the teachers' role is to facilitate students' own enquiry (91%) they also believe that students' learning depends on their background knowledge so teaching facts is necessary (86%). With respect to the curriculum, teachers simultaneously hold that they should follow the curriculum strictly; every topic should be finished within the set time (77%) and teaching thinking and reasoning are more important than teaching specific curriculum content (88%). They also hold traditional beliefs about student voice and classroom environment but more contemporary beliefs about student performance. For example, they believe it is better when the teacher not the students decide on the activities to be done (87%); a quiet class is needed for effective learning (70%); and poor performance is a performance that lies below the students' previous achievement (73%).

Bringing Teacher Beliefs and Practices Together

While teachers hold both contemporary and traditional educational beliefs and principles, their traditional views on teaching continue to dictate their teaching practice (when explicit suggestions of contemporary instructional practice e.g., responding to a survey or reading educational literature are not present). The teachers' own self-reports of their practice and classroom observations indicate that in most lessons' teachers give students textbook tasks and check them. Students do these tasks twice as often individually than in small groups. It is also clear that practices based on a constructivist philosophy such as students engaging in a week or longer projects, debating ideas and using ICT for learning are '*seldom*' to '*never*' used by most teachers. What is needed is helping the teachers to recognize the contradictions in their beliefs and providing them the necessary knowledge, skills and support to make the transition from teacher-centered to student-centered instructional practice.

The Teaching of English

Teacher confidence in their preparedness for teaching English

The English language teachers express confidence (*very well & well prepared*) in their preparedness to teach English to their students. Interestingly, while 75% of the teachers feel confident to teach the English curriculum, they only feel so in teaching certain aspects of it. 75% of teachers feel confident to teach grammar and vocabulary and develop students' reading and writing skills. Fewer teachers feel confident to teach the skills of listening (60.7%) and speaking (64.3%), have students work in cooperative groups (53.6%), teach students of diverse abilities (57.1%), conduct formative assessment (53.6%), and facilitate authentic learning (50%). Their confidence, however, drops considerably in their abilities to teach students to communicate with others in English (42.8%), and use a variety of

summative assessment strategies (39.3%). The teachers feel least prepared to use ICT to teach (42.8%) and facilitate student learning (39.3%).

Teaching resources

The scarcity of resources for teaching English language was a prevalent issue in most schools. Only 32.1% of the English language teachers report all students in their schools have a textbook! Most of the textbooks are not based on the new curriculum. None of the schools have sufficient additional resources for teaching and learning English such as teacher manuals and teaching aids for teachers (7.1%) or story books, dictionaries, thesaurus, and audio-visual resources for students (14.3%). Only 10.7% of teachers have access to the internet. 57.1% of the teachers report there are no additional resources available at their schools.

Teacher beliefs

The English teachers' educational beliefs are largely contemporary. They believe (*strongly agree & agree*) that a variety of instructional strategies should be used to facilitate students' learning, such as playing educational games (96.5%), reading different kinds of books (96.4%), speaking with native speakers (92.8%) and working in pairs and small groups (89.2%). They do however also hold more traditional educational beliefs with all (100%) *strongly agreeing* that memorizing as much vocabulary as possible is the key to successfully learning English.

Teaching practice – self-reports

English teachers were asked to report the frequency (*every, most, few & never*) with which the following happened in their regular lessons. In almost all English lessons (*every & most lessons*), teachers focus on vocabulary and grammar. They have students learn new vocabulary (100%), develop pronunciation and intonation (96.4%), watch the teacher explain grammar rules (75%) and do grammar exercises (89.3%). In most lessons teachers focus attention on the language skills. They have students do writing exercises from textbooks/worksheets (78.6%), engage in speaking activities such as retelling stories and repeating dialogues (71.5%) and complete reading comprehension exercises in writing (64.2%). Teachers have students work on these tasks more frequently individually (71.4%) than in groups (56.3%). Much less exercised in English lessons (*few lessons*) are students listening to stories/text and doing listening comprehension exercises (71.4%), communicating their ideas through presentations (67.9%) and engaging in free writing (82.1%).
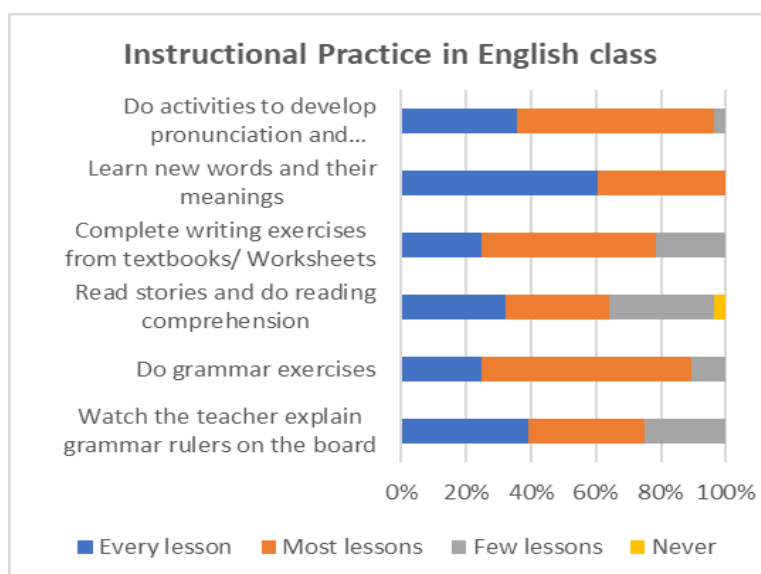
Figure 4: Instructional practices of teachers in English class

Teaching practice – lesson observation

English
Grade: 9
Number of students: 16
Topic: I am Jim, 'So am I'
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments […]

T: Good morning everyone. I want each of you ask how you are.
S: How are you?
S: I am fine what about you? (Ss ask the question of each other)
T: I see you are OK. Now let's begin our lesson. The theme of our lesson is "I am Jim. So am I". Today, at the lesson you will read, write and answer my questions, describe photos, listen and do some tasks on grammar. And during the lesson you will get stars of different colour, e.g., 5-is red star, 4-blue star and 3-green star.
T: Now, let's check up your homework. Your homework was to complete the sentences with particle from the box, ex. 8 C on page 141.
[The teacher displays a chart with the correct answers for the homework task with the scoring guide. Students exchange their copies and check each other's homework as per the chart]
T: Open your book page 94. Look at the photos and describe the two men. You should work with your partners and on this work, I will give you two minutes. What should you do now?
Ss: Describe two men with our partners.
T: How should you do this work? (No response. Ss begin working in pairs to describe the picture)
T: So, you finished. Are two men similar?
S: Yes
T: So, the new word for the lesson is the word 'twins'. Do twins look same?
S: Yes
T: Are they born at the same time?
S: Yes
T: Do they celebrate their birthday together in one day?
S: Yes
T: Is there connection between them?
S: Yes
T: Now listen (Teacher starts to read a short passage). [She did not give any pre-reading task]
T: There are a lot of families who cannot have children. They love them very much but they have no opportunities and that's why they go to the children's home to take a boy or girl.
T: [after reading] What process do they do when they take children from the children's home?
Ss: (No response)

T: Adopt, that is called adopt. Repeat after me 'adopt'
Ss: Adopt (in chorus)
T: Adopt is a verb and it has two syllables
T: Now, open your book page 12, read the short text from your textbooks and work with your partner to find answers to the questions
Ss: (reading individually)
T: Your time finished now with your partner answer given questions
Ss: (discussing answers)
T: Now let's check in open class. First question: who are they? (points to students to answer)
S: Twins
T: Why didn't they know each other?
S: Because they were adopted by two different families when they were babies
T: When did they meet?
S: When they were 39 years old.
T: The next task is to listen to an audio-recording and fill in the gaps in the scripts I am giving you. While listening you need to complete the worksheet (The teacher distributes the dialogue scripts with blanks for students to fill in).
T: Now, finished. I will provide worksheets with the correct answers to you and you assess each other's work.
T: Discuss with your partner what the people in the dialogue have in common.
Ss: (ss are discussing in pairs)
T: What they have in common?
S: They have a son. Their sons' name are James. They have a dog
T: When you want to say that there is something common: so+auxiliary+I and in negative sentences neither+auxiliary+I. [Much time is spent on explaining the grammar structure and very little time on practice of the structure].
T: You are going to listen to the sentences, and you have to say that you are the same using so____ I or neither _____ I (Teacher points to students to answer)
T: I like chocolate
S: So do I
T: I am tired
S: So am I
T: I don't smoke
S: Neither do I
T: I am not American
S: Neither am I
[Throughout the lesson, the same students are asked to answer. Many students do not participate at all. When it is evident students make mistakes or do not understand any point the teacher does not explain or correct their mistakes. The teacher gives the students who participate stars every time they give an answer].
T: Now, let's count the stars, who got more? Aleksei, you have the most stars 4 stars, so you will get 5 mark (The teacher calls out the names of a few more students and gives them marks based on the number and colour of stars they have).
T: Write down your homework: Make up six sentences using so___ I and neither ___ I. The lesson is over. Bye

School D, Date of lesson observation: April 16, 2018

Box 1: English lesson observation

Bringing English teachers' beliefs and practices together

Although the English teachers largely hold contemporary beliefs, their instructional practice is still mainly traditional, emphasizing memorization of vocabulary and grammar and doing reading comprehension and writing exercises from the textbook. Teachers likely focus on these areas as they are confident in their preparedness to teach them. The constructivist philosophical beliefs English teachers report and practices that should follow from them such as reading different kinds of books, communicating with native speakers, engaging in free writing are not exercised, because of the poor English language skills of many teachers, a

lack of preparedness and scarcity of resources to conform teaching to their beliefs. Moreover, although 89.2% believe that students should work in groups, only 56.3% report having their students do so. This reflects the number of teachers who feel prepared to conduct group work.

If teachers are to meet the curriculum goals and the key competencies outlined in the SSE they will have to be better prepared both in terms of their own language and teaching skills . English language teaching would also be facilitated by a curriculum that clearly identifies the learning outcomes for each grade, provides exemplars of activities and rubrics for authentic assessment of the language skills. Furthermore, the provision of resources, textbooks for all students and computers connected to the internet would also be facilitative.

The Teaching of Informatics

Teacher confidence in their preparedness for teaching informatics

The informatics teachers are particularly confident (*very well & well prepared*) to teach the informatics curriculum to their assigned grades (85%). Most of them express confidence in teaching students with diverse abilities (85%), connecting informatics lessons to real-life (80%), making connections between informatics and other subjects (80%) and teaching students to behave safely (80%) and ethically online (80%). In using various pedagogies, they are more confident in having students work in cooperative learning groups (75%) and least confident in conducting project work (40%). With respect to assessment, about two-thirds are confident in using a variety of formative (65%) and summative assessment strategies (60%). They however, express less confidence in preparing materials to use with an interactive whiteboard (60%).

Teaching resources

Only 15.8% of the informatics teachers report that computers are available and sufficient for their students. The rest indicate the computers are old or need repair (31.6%) or are insufficient (47.4%). For their own use only 25.3% of teachers report there are

Figure 5: Conditions and availability of resources for teaching ICT

sufficient computers. The rest claim the computers are old or require repairs (31.1%) or insufficient (43.6). Only 20% of the teachers report they have a good internet connection, whereas 55% state the internet connections are not adequate and 25% indicate internet connections are not available.

Teacher Beliefs

The informatics teachers overwhelmingly believe (*strongly agree & agree*) that students learn best when ICT is integrated in the teaching and learning activities (100%). This is especially apparent when ICT is integrated in connecting students' learning to real-life (100%), encouraging autonomous learning (100%), promoting collaborative learning (96%), and improving classroom climate (100%). Fewer however, believe that an effective way to learn ICT is by doing group projects (80%).

Teaching practice – self reports

The teachers report they usually (*every & most lessons*) demonstrate how to do programming or how software/hardware works (80%), have students produce a text using a word processing programme (75%), less frequently they have students create a presentation with

Figure 6: Activities completed by students in ICT class

video or audio clips (45%) and seldom do they have students work on extended projects (25%). They have students work individually (90%) more often than in pairs or small groups (60%) on these activities.

The teachers reports indicate that some commonly used ICT skills are rarely (*few lessons & never*) taught or used in the informatics class: capture and edit digital photos, movies or other graphics (85%), email to communicate with others (75%), create databases (75%), work with internet links and materials (70%), use spreadsheets (40%), or use spreadsheet to plot graphs (50%). More than 60% of the informatics teachers indicate their students '*never*' have a chance to participate in online discussions, create and maintain a blog or websites, use social media, or install software on computers. There could be several reasons for this. These common ICT skills are not included in the informatics curriculum, there are not enough computers with internet access for all students, and teachers do not see developing these skills as important.

Teaching Practice – lesson observation

Informatics
Grade: 8
Number of students: 26
Topic: Power Point Presentations
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments […]

T: Good afternoon everyone.
Ss: Good afternoon teacher
T: Today we will learn how to make power point presentation.
T: What is a power point presentation?
Ss: It is when you make presentation in computer (in chorus)
T: What is a slide?
S 1: It is also presentation.
S1: It is page in presentation.
T: When do we use slides?
S: May be to make presentation?
T: OK, thank you. So today we will be able to create slides, select design of slides, insert pictures and graphs, and use animations in power point presentation.
T: Now look at the interactive board while I am explaining steps to create a power point presentation. When I am speaking, you should follow the steps on your computers working together in pairs.
T: First I will explain how to find a slide design from the internet (Teacher is showing and explaining each step and students are following the steps).
Ss: [Students are having various difficulties such as being unable to access the internet, have not completed the task and teacher has moved on to a new task, one student in the pair doing all the work the other just observing, but the teacher does not move around the class to check on how they are doing and to assist them]
T: (Teacher shows how to insert a table, picture, diagram, and use animation)
T: Now, you understood how to do it?
Ss: Yes (in chorus)
T: Can you do a presentation on any topic now?
Ss: Yes (in chorus)
T: Then write down your homework. It is to make to make a power point presentation on the topic 'Kyrgyzstan' for homework.

School J, Date of lesson observation: April 19, 2018

Box 2: Informatics lesson observation

Brining informatics teachers' beliefs and practices together

The informatics teachers' beliefs and practices are largely incongruent. While they believe it is important to use ICT to connect learning to real-life and build autonomous learners, little of this is observed in their teaching. Rather they have students watch them demonstrate 'how to' and then practice the skills demonstrated. The insufficiency or unavailability of computers with internet access in most schools have teachers doing what the limited resources permit. They have students do word processing, make power point presentations and learn programming languages rather than connect learning to real-life by providing students the opportunity to browse the internet for information, use email to communicate with others or participate in online discussions.

Without sufficient computers and high-speed internet informatics teaching will be limited to acquainting students with the theoretical foundations of ICT and not to acquiring the practical skills in using ICT tools for studying and everyday life (goals of the ICT curriculum). Moreover, none of the five competencies identified in the ICT subject standard: information literacy, logical and algorithmic thinking, use of computers and other ICT tools, modelling and design, and communication will be realized. Furthermore, in a limited resource environment it is important to prepare teachers to creatively use the limited resources effectively.

The Teaching of Mathematics

Teacher confidence in their preparedness for teaching mathematics

In this study, the mathematics teachers express the most confidence in their ability to teach the mathematics curriculum with all of them (100%) indicating they are *very well* (15.4%) or *well prepared* (84.6%) to do so. Most mathematics teachers are confident (*very well & well prepared*) with using students' prior knowledge and experience to build new knowledge (92.3%). With respect to problem solving, teachers are confident to teach math concepts and skills through problem solving (76.9%), teach students to use manipulatives to solve meaningful problems (69.2%) and investigate and solve real-world problems (69.2%). Most are confident in asking probing questions which require students to justify their responses (80.8%) but much fewer are confident in encouraging students to explain how they found their solution and choice of method (57.7%). In terms of using various instructional strategies most confidence is expressed in their ability to have students work in cooperative learning groups (76.9%) than in conducting discussions on mathematical ideas (53.8%) and engaging students in mathematical enquiry (46.1%). Most are confident of differentiating instruction to meet the learning needs of all students (80.8%) but fewer in teaching students to think abstractly (65.3%) or connect mathematics to other subjects (65.3%). More teachers are confident in using summative assessment strategies (65.3%) than in conducting formative assessment (53.9%). Using ICT to teach mathematics is the weakest point of the mathematics teachers with 69.2% '*somewhat prepared*' and 15.4% '*not prepared*' to do so.

Teaching resources

Similar to the English and informatics teachers' responses, lack of resources for mathematics teaching is a common issue in almost all schools. Only 7.7% of the mathematics teachers indicate that all students in their schools have textbooks! 92.3% of them report textbooks are either outdated or insufficient. A high percentage of them report additional mathematics textbooks or printed resources (42.3%), teacher guides/manuals (30.8%), mathematics instruments (19.2%), mathematics models (34.6%), and audio-visual resources (57.7%) are not available.
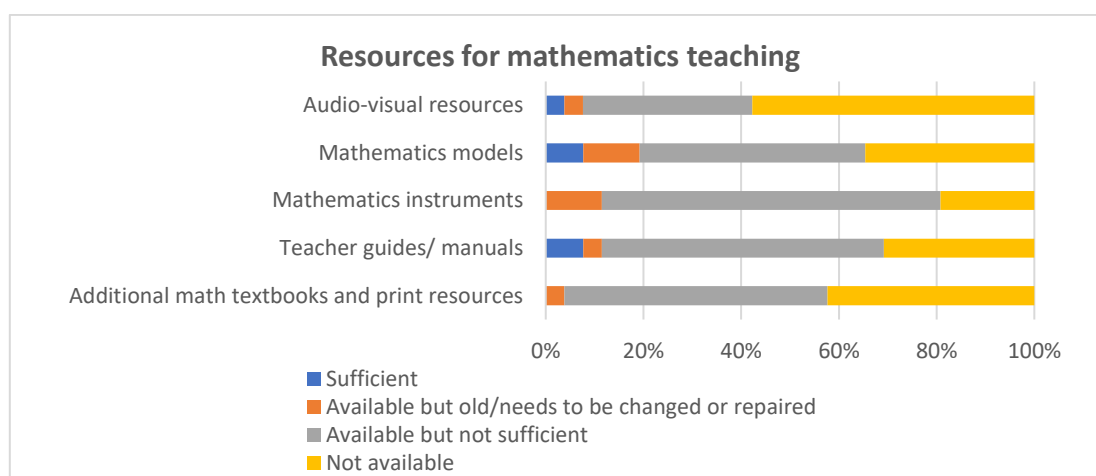
Figure 7: Conditions and availability of resources for teaching mathematics

Teacher beliefs

The teachers indicate strong beliefs about student learning of mathematics '*strongly agreeing and agreeing'* that students learn mathematics best when: they solve real-life problems (88.4%); the teacher explains how to solve problems on the board (84.6%), they practice solving problems independently (92.3%) and in small groups (88.5%) and ask lots of questions (88.5%). Mathematics teachers also seem to have inaccurate and stereotypical beliefs in terms of student aptitude and gender for learning mathematics. 61.5% of them think that mathematics is a difficult subject, so only academically competent students should study it, and 46.1% of them think that boys are better at learning mathematics than girls. They all (100%) hold that students need extra time out of class to understand most topics in mathematics, indicating an overloaded curriculum that cannot be completed in the time scheduled for mathematics.

Teacher Practice – self-reports

The teaching in mathematics lessons as per teacher reports largely focuses on procedural knowledge acquisition (steps of solving mathematics problems). High percentages (*every & most lessons*) of the students' activities are focused on students solving mathematics problems on the board (92.3%), completing textbook exercises (88.5%), memorizing formulas and rules (73.1%), watching teachers demonstrate how to solve problems (69.3%) and taking a test/quiz (57.7%). The students do these activities more often individually (73.1%) than in groups (53.9%). Teaching that requires students to use higher order thinking skills are less exercised (*few lessons & never*) in mathematics lessons. Teachers seldom have students work on problems that have no immediately obvious solution (69.2%), investigate and solve real-world problems (61.5%), create problems using real-world situations (65.3%), explain their reasoning or thinking in solving a problem (53.8%), use manipulatives (53.9%) collect, analyse and draw conclusions (53.8 %) and represent or analyse relationships using tables, charts and graphs (50%). Moreover, they hardly ever (80.8%) use ICT in their mathematics lessons.

Teaching Practice – Lesson observation

Mathematics
Grade: 8
Number of students: 23
Topic: Solution of quadratic equations reduced to quadratic equations
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments […]

T: Good morning
Ss: Good morning teacher
T: Let's start our lesson. I will check your homework. Who solved the tasks given for homework?
Ss: (Four students raise their hands)
T: You and you come to the board and solve the tasks (pointing to two students sitting in the front benches)
Ss: (Started solving number 8 of task 602)
T: I will see if others did homework or no (While the two students are solving the task on the board, the teacher walks around the class checking students' copies to see whether they had done their homework). [Teacher didn't give feedback]
T: Now let's start a new topic, 'Solution of quadratic equations'
T: What is quadratic equation? – ax2+bx+c=0 such equations are called quadratic equations. Here a is not equal to o, a, b, c are different numbers and x is variable.

T: How do we solve quadratic equations? – To solve quadratic equations, first we need to find D the discriminant. The formula is D=b2 – nac …. [He further explained the formula]
T: Now I will show you how to solve quadratic equations using the formula
(Teacher demonstrated how to solve (x2-5x+4) (x2-5x+6) =120 on the chalkboard and two more tasks to explain the topic).
[While the teacher is explaining, some students are not paying attention and the teacher does nothing to get their attention].
T: So, you need to solve the tasks of this topic in the same way. Do you have any questions regarding how to solve the tasks?
Ss: (No student response)
T: If everything is clear, then we will now solve tasks from the textbook. Open your book, task # 604. Who wants to solve on the blackboard?
Ss: (Two students raised their hands)
T: Ok, come to the board and solve the tasks (to the two students who raised their hands). Then you and you also come [called four students to chalkboard]. Now solve the tasks a-b-c-d of # 604
T: (To the rest of the students), You do the same tasks in your copies.
[For the rest of the lesson the teacher focuses only on the four students solving the problems on the chalkboard. Some students are trying to do the task independently while the rest of them are coping the solutions off the chalkboard)
Bell rings
T: OK, now write down your homework. You should finish solving all parts of task # 604 and additionally 605. The lesson is over.
[No feedback and no assessment]

School A, Date of lesson observation: April 28, 2018

Box 3: Mathematics lesson observation

Bringing mathematics teachers' beliefs and practices together

All the mathematics teachers express confidence in their preparedness to teach the mathematics curriculum. They, however, indicate they are better prepared to do so using teacher-centered rather than student-centered instructional strategies. They hold beliefs that are both teacher-centered and student-centered. For example, 84.6% of them *strongly agree and agree* that the teacher should explain how to solve problems on the board while also believing that students should solve problems independently (92.3%) or in small groups (88.5%)**.** Their confidence in teacher-centered instruction and their teacher-centered beliefs are clearly reflected in their practice. They have students watch as they demonstrate how to solve textbook problems on the board, following which they have students use the same algorithm to solve the remaining textbook problems at their desks or on the board and do more of the same for homework. Teaching that requires students to use higher order thinking skills are much less exercised. They seldom have students explain their reasoning or thinking in solving a problem, investigate and solve real-world problems, and work on problems that have no immediately obvious solution. They hardly ever use technology in their mathematics lessons as they lack confidence in their ability to do so.

With teachers expressing little confidence in using innovative instructional strategies and assessment methods and their mathematics lessons focused on acquisition of procedural knowledge, it is highly unlikely that the goals for mathematics as identified in the curriculum which seek for students to acquire mathematical knowledge and skills useful for life, study and work; develop higher order thinking skills such as logical thinking and reasoning; and develop such character traits as independence, persistence and intellectual curiosity will be

met. It is imperative that mathematics teachers be developed with the knowledge, skills and character qualities that will enable them to realize these ambitious goals.

The Teaching of Science

Teacher confidence in their preparedness for teaching science

The reports of science teachers indicate a high level of confidence (*very well & well prepared*) in their preparedness to teach science, except for the aspects that involve conducting experiments, investigations and discussion of scientific ideas. 79% of the science teachers feel confident to teach the science curriculum to their class, 80% to ask questions that get students to think deeply about science, 76% to get students to understand underlying concepts in science, and 74% to help students use scientific ways of talking and writing. In terms of student assessment teachers feel they are better prepared to use a variety of summative assessment strategies (79%) than engage in formative assessment (71%). They are also highly confident in their abilities to interest and engage students in science. Most claim they can connect science content to real-life (90%), make connections between sciences and other subjects (93%), encourage all students to participate fully in science learning (92%), and encourage students' interest in the sciences (93%). The science teachers are, however, relatively less confident to engage students in science enquiry (65%) and conduct discussions on science ideas and investigation (48%). They are least confident with all aspects of scientific experiments including demonstrating science experiments (50%), teaching science process skills (59%), using simple equipment and easily available materials to conduct science experiments (62%) and managing and supporting a class of students engaging in science experiments/investigations (46%). Unlike the English and mathematics teachers, the science teachers feel better prepared to use ICT to teach science with 69% reporting confidence in their abilities to do so.

Teaching resources

Similar to the English, mathematics and informatics teachers, the science teachers also report insufficient resources for teaching and learning science. Less than 10% of the science teachers indicate sufficient science teaching materials at their schools (equipment for science: 7% sufficient, 22% not available; materials/chemicals for experiments: 7% sufficient, 45% not available; science models: 9% sufficient, 31% not available). Less than 20% of the teachers report sufficiency in additional science textbooks and print resources (12%), teacher manuals (16%), audio-visual resources (17%), and computers with internet access (17%).
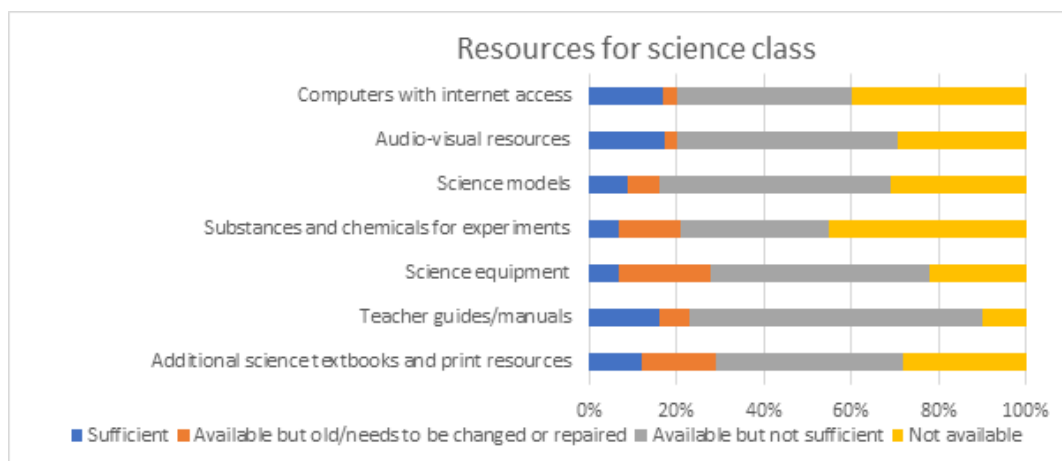
Figure 9: Conditions and availability of resources for teaching sciences

Only 34% of the teachers report there were science textbooks for every student at their schools. Availability of science textbooks in schools is the best as compared to the other subjects, although the percentage of availability is still very low. The school directors also confirm such shortage. A third (35.3%) of the school directors indicate that the science laboratories at their school are not well equipped, yet 70% of them indicate they would not spend money on updating the science laboratories even if money were available. There is need to find out why the school directors are unwilling to spend available money on providing resources for scientific investigations so important to students understanding scientific concepts and developing science skills.

Teacher beliefs

Similar to the other teachers, the science teachers hold both contemporary and traditional educational beliefs. 87% of the science teachers '*strongly agree and agree*' that the best way to learn science is 'deductive learning' (learning facts first and then conducting experiments) rather than 'inductive learning, 69% believe that teachers' explanations are the most effective way for students to understand scientific concepts and 65% hold that memorizing facts and procedures is most effective for learning science. But they also hold beliefs diametrically opposed to these such as students learn most effectively by connecting the principles of science to real-life situations (98%), sharing ideas with their peers (90%), and asking lots of questions (100%). Like the mathematics teachers, the science teachers also believe that talent rather than effort and gender influence science learning and achievement. 55% believe that only academically competent students should study science, and 42% hold that boys are better at science than girls. Similar to the mathematics teachers, 91% of the science teachers feel students need more time than scheduled to understand most science topics. This indicates an overloaded science curriculum which teachers find hard to cover within the scheduled time.

Teaching Practice – self-reports

The science teachers' self-reports of their teaching practice show it is mainly passive and teacher-centered. Lower order thinking activities are the most frequent (*every & most lessons*) learning activities in science classrooms. These include completing textbook exercises (93%), reading from the science textbook (66%), taking notes from lectures or the textbook (64%) and finally a quiz or test (79%). On the other hand, higher order

Student activities in science lessons

Go on science related field trips

Design and conduct their own scientific experiments/…

Work on extended science investigations or projects

Engage in science inquiry

Complete exercises from a textbook

Read from a science textbook

0% 20% 40% 60% 80% 100%

■ Every lesson ■ Most lessons ■ Few lessons ■ Never

Figure 9: Student activities in science lessons

thinking activities are the least frequent (*in a few lessons & never*) learning activities in science classrooms. Most teachers hardly ever have students do extended science investigations or projects (90%), design their own experiments or investigations (88%), engage in science enquiry (76%) and take students on science field trips (87%).

Teaching Practice – lesson observation

Chemistry
Grade: 8
Number of students: 28
Topic: Oxides, acids and bases
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments […]

T: Good morning dear students. Let's begin our lesson. Today in the lesson we will write formula based on given diagrams and we will experiment and explain what happened in experiments.
T: Let's revise our last lesson. I will ask you questions: What are oxides?
S: Oxides are chemical compounds with one or more oxygen atoms combined
T: What is the number of valence electrons in oxide ion?
S: Eight.
T: Good. I will show you charts. You should write chemical formula based on it (Teacher displayed 3 charts: oxides, acids and bases).
[The content of one chart is given below. There were two more similar charts one with Sulphur monoxide (SO) and another with OH (hydroxide) in the centre]

Zn
Fe   Si
S   O   K
C   Al
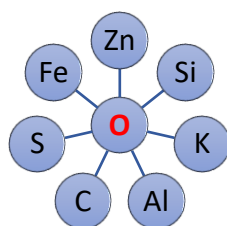
Ss: SiO2, FeO2, H2SO4, NaOH, Ca(OH)2 etc.

T: The teacher then wrote reactions of different acids with bases to form salts and asked students to fill in the missing elements and balance the formulas.

S: (students fill in the missing symbols of elements to complete formulas and try to balance them)

T: From mathematics we know that there must be the same numbers on both sides for the formulas to balance. [When students do not balance the equations correctly, the teacher asks probing questions until students do it correctly. Questions like: What is missing here? To balance it what number should be here? etc.]

T: [looking at blackboard] Tell me children what substances do we call salts?

S: Salt, substance produced by the reaction of an acid with a base. A salt consists of the positive ion (cation) of a base and the negative ion (anion) of an acid. (Teacher asked another student to repeat the answer)

T: Now we will have some activity. Tell me, what should we do when we work with chemicals?

Ss: We should keep precautionary measures. We need to be careful while using acids

T: (writes on the board) Indicators – litmus paper, methyl orange, phenolphthalein (lifting up the paper and bottles to show the students).

T: Here are acids, you will put a few drops of the indicators and see what happens (Calls a student to add methyl orange to an acid in a test tube which the student does)

T: Why did the color change when we added methyl orange?

Ss: Indicators change colour of substances [Teacher did not get student to explain]

T:(Called another student to add litmus paper and observe how colour changed) [The fact that the indicators turn different colours to show whether the substance is an acid or base is not emphasized. All the activity is done at the teacher's desk at the front of the classroom so not all students are able to observe what is being done].

T: Who wants to try more, to add indicators to acids and see how colour changes (some of the students are given the opportunity to repeat the activity)

T: Before doing, tell me what will you do?

S: I will add methyl orange into acid and then colour will change.

T: Now let's sum up. Here are pockets displayed, named acids, bases and salts. I will give you formulas written on cards; you decide to which pocket they should go.

Ss: Look at the card, walk to the board and put their card in a pocket.

T: (pointing to three students) You come up front, remove the cards from the pockets and check whether they are correct or if they are any mistakes).

Ss: (each one in turn) There are no mistakes.

T: I will now assess. Nurlan gets 5 because he has written formula correctly and could explain what happened when we add indicator to acid (teacher gave marks to a few more students with feedback) [The teacher tried to ensure all the students pay attention and stay focused throughout the lesson by trying to involve all of them in the lesson].

T: The lesson is over. Bye

School A, Date of lesson observation: March 15, 2018

Physics
Grade: 9
Number of students: 33
Topic: Revision: Solving tasks
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments […]

T: Good morning.

Ss: Good morning teacher

T: Today we will not have new topic. I will ask you some questions from previous lessons and then we will solve tasks based on them.

T: So, are you ready for the lesson?

Ss: Yes

T: Here are the questions. Those who have card will write answer on the board.

T: What is the isotopic composition of the ions: Neon, Carbon, Uranium?

Ss: (Writing on board) 20/10Ne, 21/10Ne, 22/10Ne; 12/6C, 13/6C, 14/6C; 235/92U, 238/92U [students were helped by some prompting from colleagues].

T: Write the reaction chain of Uranium decay?

Ss: 231/90 Th+4/2He (could not complete the reaction) [Teacher did not prompt nor complete the equation]

T: How does uranium turn into plutonium as a result of radioactive decay?

[There were 2 more questions the observer could not record]

T: Now we will solve tasks [Teacher displayed five tasks on the screen. Examples are provided] **Task 1:** Record the nuclear reaction that followed the release of a proton during the bombardment of aluminum with an alpha particle. **Task 2**: Write the nuclear reaction accompanied by the release of neutrons during the bombardment of Boron (11/5 B) with α – particles. **Task 3**- Fill in the missing designations in the following nuclear reactions:

27/13 Al + 1/0 n → ? +4/2 He   (24/11 Na)

55/25 Mn + ? → 55/26 Fe → + 1/0 n   (1/1 H)

? + 1/1 H → 22/11 Na + 4/2 He (25/12 Mn)

27/13 Al + j → 26/12 Mg + ?   (H1/1)

T: Who wants to come to board and solve tasks (a few students raised their hands and three were called to solve the tasks on the board)

T: These students will solve the tasks on board, you must complete the tasks independently.

[The teacher works with the students at the board, then walks around the class checking the work students are doing. The teacher helps some of those who have made mistakes. Those who cannot solve the problems independently are not helped but told to copy the problems from blackboard].

T: For homework, you have two tasks to complete. Write tasks on copybook from the screen.

[Teacher then scores students on the 4-point scale but other than giving them a number there is no feedback]

School L, Date of lesson observation March 19, 2018

Biology
Grade: 9
Number of students: 33
Topic: Structure and functions of internal organs of the esophagus
Legend: Teacher (T), Student (S), Students (Ss), actions (…), observer's comments [...]

T: Good afternoon. Let's start our lesson. We will first revise our last lesson. I will give you cards with questions and you need to answer. You have 2 minutes to answer.

[Teacher selected six students and gave the cards to them]

T: Now your time is finished, start answering. Show intestine on the diagram [chart displayed on board] and state its length.

S: Here are the intestines and length is around 5-6 meters long (Student traced large and small intestines on the diagram)

T: You are right. Next question, how long does food stay in the intestine?

S: 6-8 hours.

T: Next question: What does tooth consist of?

S: Upper teeth and lower teeth.

T: It is wrong. Human teeth are made up of four different types of tissue: pulp, dentin, enamel, and cementum. You have to revise more.

[There were 3 more questions asked by the teacher, students could give correct answers to four of the six questions. The teacher gave the correct answers to the other two herself]

T: Now, we will have new topic. Open your copies and write down the topic of the lesson "Liver".

T: Here is the model of liver (Showing it. She tells the students to take notes and then reads out what is written about the liver on a power point presentation on which there are notes and pictures)

The liver is a large, meaty organ that sits on the right side of the belly. Weighing about 1.5 kilograms, the liver is reddish-brown in color and feels rubbery to the touch. Normally you can't feel the liver, because it's protected by the rib cage. The liver has two large sections, called the right and the left lobes. More than 500 vital functions have been identified with the liver. Some of the more well-known functions include the following:

- Production of bile, which helps carry away waste and break down fats in the small intestine during digestion
- Production of certain proteins for blood plasma
- Production of cholesterol and special proteins to help carry fats through the body

- Conversion of excess glucose into glycogen for storage (glycogen can later be converted back to glucose for energy) and to balance and make glucose as needed
- Regulation of blood levels of amino acids, which form the building blocks of proteins
- Processing of hemoglobin for use of its iron content (the liver stores iron)
- Clearing the blood of drugs and other poisonous substances
- Regulating blood clotting
- Resisting infections by making immune factors and removing bacteria from the bloodstream

(During the lecture she draws on their knowledge from other subjects, 'You learnt in chemistry about catalysis…' and makes connections with the real-world '…you should eat warm food not cold…')
T: Now I will give you task for group work [Immediately, after the lecture the teacher gives a task for group work, without making sure that all the students understand the topic]. Group 1-write down what happens to food in the mouth. Group 2 – in the intestine. Group 3 – how other organs contribute to food digestion. [Students are not told how to cooperative, nor is the time for group work given]
Ss: [Students spend a lot of time drawing diagrams, write a few notes and present their work to the rest of the class. When one group is presenting, the students in the other groups do not pay attention]
T: [Teacher attends to groups presenting but does not comment on the content or the presentation].
T: Now you need to assess each other. [No criteria for assessing was shared. The students from each group assigns marks to the other group without any feedback]
T: It is the end of our lesson. You need to revise topic Liver by reading from your textbook. Lesson is over. Bye.

School K, Date of lesson observation: March 29, 2018

Box 4: Science lessons observation

Bringing science teachers' beliefs and practices together

The science teachers are confident in their preparedness to teach the science curriculum except for conducting experiments, discussion and enquiry. Their beliefs that deductive learning, teacher explanation and students' memorization of facts and procedures are important for learning science are evident in the self-reports of their practice and in the observations of their lessons. In most lessons, teachers have students completing textbooks exercises, reading from the textbook and making notes from the textbook or lectures. Learning activities that require higher order thinking such as science enquiry, discussion, experiments and projects are far less used in science lessons. Quizzes and tests are aimed at assessing students' knowledge not at ensuring students are learning. The teachers' belief that only competent students should learn science is reflected in the little attention paid to some students during science lessons.

The standards and science curriculum emphasizes using science to understand scientific phenomena occurring in the world and the application of knowledge to real-world situations. Stressing the importance of doing so through the conduct of scientific experiments and enquiry. These areas, however, are the very ones in which science teachers feel they are not well prepared to teach neither have the resources to support such teaching. Therefore, science teaching focuses on knowledge transmission and learning on rote memorization of scientific facts. Moreover, the belief's that talent not effort facilitates learning means that teachers are likely to focus on the 'bright' students leaving the 'struggling' ones behind.

Factors supporting and hindering teaching

Research shows that school leaders are concerned about both shortage and inadequacy of teaching staff as well as the lack or insufficiency of instructional materials as they perceive resource shortages hinder instruction and lower student performance in the school (OECD 2007, p. 263). Similar to the school leaders in the research cited above, the school directors in this study report that their schools' capacity to provide quality teaching is hindered '*a lot*' by inadequate and poorly qualified teaching staff, lack and inadequacy of infrastructure, equipment, teaching and learning resources, and financial resources.

Only 30% of school directors report their schools have enough teachers for all subjects. School directors also report inadequate or poorly qualified teachers of science (30%), mathematics (35%), English (35%), informatics (35%), and other subjects (35%), as well as a shortage or inadequacy of support staff (15%). It is not surprising then that 45% of them indicate that teaching is hindered '*a lot*' by the lack of teaching staff.

Because of our focus on science, school directors were especially asked to report on the quality of the science departments in their schools. All the school directors report that their science teachers are among the best teachers at their schools. However, they state only between 30%-50% of these science teachers can provide quality science teaching. This is likely because of the lack of preparedness but also the lack of resources to support quality science teaching. Only 30% of school directors report they have well-equipped science laboratories, 30% have enough laboratory materials for the use in all courses, 55% have materials for hands-on science activities and 55% have extra laboratory staff to support the teaching of science. Even though only 30% of school directors state their science laboratories are well equipped and 30% have enough laboratory materials for use in the teaching of all science courses, only about a third of them assert the teaching of science is hindered '*a lot*' by inadequate science laboratories, equipment and materials. Moreover, only 30% of school directors report spending extra money to update the science equipment in their schools and most (70%) indicate that even if they have extra funding it would not go to improve their science department. These findings are concerning firstly, because the reports of the school directors do not indicate as severe a lack and inadequacy in the science departments in their schools as the reports of the science teachers indicate. Secondly, two-thirds of school directors do not seem to think that a lack of science laboratory equipment and materials hinders science teaching. This may be because the school directors hold traditional education philosophies seeing science teaching as dissemination of information rather than learning from doing science experiments and investigations. Because of their beliefs about the teaching of science they do not see the need to spend money (even when available) on improving the science departments in their schools.

The teaching of all subjects, especially informatics, is adversely affected by the shortage of computers (40%), internet (45%) and computer software (35%) as reports of the school directors show. It is also because of teachers' insufficient ICT integrated instructional practice skills. These two factors could be either drivers or barriers to the ICT integration in teaching and learning in schools, depending on their sufficiency. In average, each school had 14 computers for education (Standard Deviation (SD=8), 4 computers for teachers (SD=3), 3 portable computers (SD=8), 9 computers with internet (SD=11), 3 multimedia projectors (SD=3), and 8 digital screens (SD=10). Though the average number of the equipment seemed

reasonable, the standard deviations show a considerable variation among schools. Some schools have more resources than others. The disparity of resources among schools will need to be addressed.

While there are many factors hindering teaching, there are some important supporting factors in Kyrgyz schools. A key supporting factor is the high levels of teacher-teacher collaboration in the schools. All the school directors report they have a school policy that calls for teachers to collaborate with each other and that the school facilitates teacher collaboration. Teachers collaborate by discussing and sharing teaching ideas and materials (100%) and meeting regularly to discuss teaching goals and issues (100%). The reports of the school directors are corroborated by the teachers. An overwhelming 96% of teachers state they discuss ideas on teaching and learning with their colleagues and 68% share teaching materials with their colleagues at least once a quarter. Moreover, 95% of teachers observe their colleague's teaching and provide feedback to them and 54% engage in joint activities across sections, classes and age groups. Furthermore, 91% of teacher report the observations and 83% the informal dialogues have a high impact on their teaching practice. Research shows that when teachers engage in high quality collaboration about teaching, learning and assessment that they percieve as impactful, their performance as well as that of their students improves (Ronfeldt, M. et.al 2015).

Another supporting factor is the high job satisfaction teachers report. 96% of teachers indicate satisfaction with their job. This sense of satisfaction is further reflected in the fact that 80% of teachers indicate that if given a chance to choose their career again they would choose to be teachers.
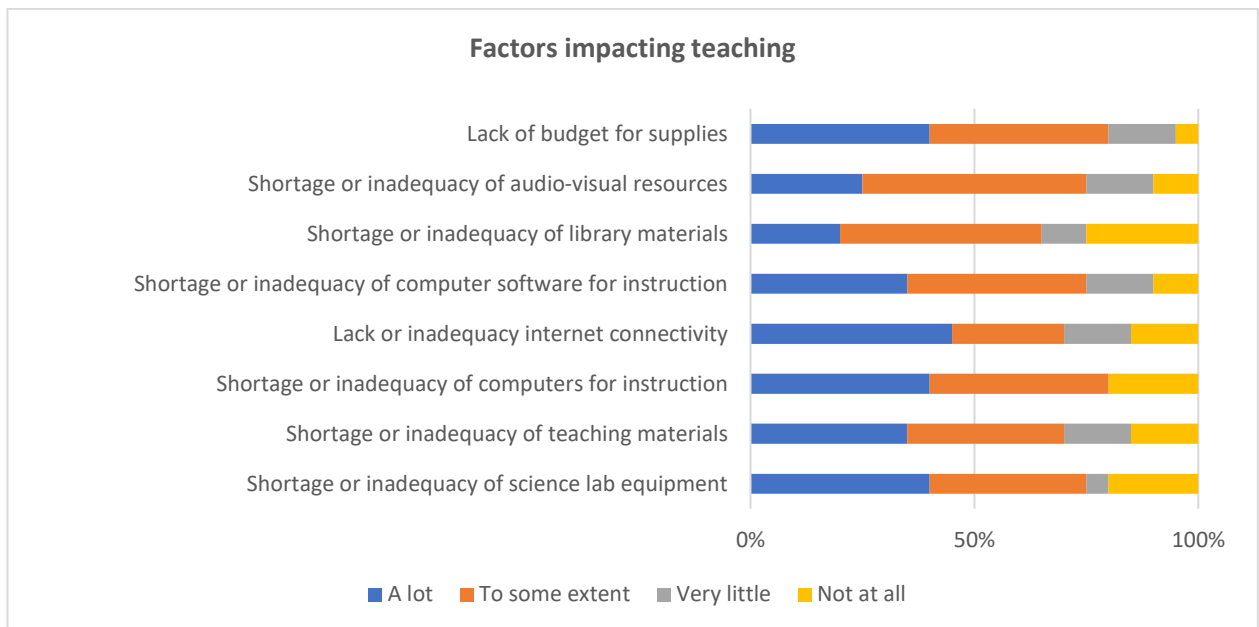
Figure 8: Factors impacting teaching in schools

Summary

Only 62% of teachers passed the knowledge test conducted in Naryn by the NTC with physics teachers obtaining the lowest maximal and minimal scores. A difference of 40% points

between the maximal and minimum scores on all the other subjects indicate that teachers' knowledge of their subject varies considerably. This finding indicates the need to review the initial teacher education programme and to provide opportunities for in-service teachers to enhance their subject knowledge. Multiple points in the data point to the fact that the teachers still tend to practice teacher-centered instructional approaches, even though they may theoretically subscribe to contemporary student-centered teaching philosophy and principles. This is most likely because teachers are not prepared to use contemporary instructional strategies such as discussion, scientific enquiry and project-based learning that not only facilitates 'deeper learning' but also develops 21st century skills and attitudes of curiosity, perseverance and responsibility. They also indicate little confidence in integrating ICT into teaching and learning. The lack of equipment and resources to support these learning pedagogies makes it more difficult for teachers to transition to contemporary instructional practice in their classrooms. More computers with high-speed internet would go a long way in making the teaching of informatics more hands-on and assist students develop skills useful for life and work as well as facilitate the integration of ICT into the teaching and learning of all subjects. These changes would help teachers realize the goals of the curriculum and the state standards.

Both science and mathematics teachers believe that students' ability rather than effort and their gender affects their performance and achievement. The belief that more talented students are better at math and science may come from a culture that values high performers. Teachers beliefs that boys are better than girls are not based on fact as in both national and international assessments girls perform at par or better than boys.

Key Findings and Policy and Practice Implications

Key findings

- Only 62% of the teachers passed the teacher knowledge test conducted in Naryn by the NTC.

- Physics teachers performed the worst among the teachers of all subjects.

- The levels of subject knowledge among chemistry, biology, physics and language teachers varied by at least 40%.

- Inadequate infrastructure, facilities, and lack of teaching resources is a prevailing issue in all schools and for all subjects.

- ICT infrastructure and science laboratory equipment and materials are seriously lacking in schools.

- Inadequate number of textbooks available to the students presents a serious problem to teaching and students' learning.

- The teachers generally hold contemporary educational philosophy (e.g., believing in self-directed learning, problem solving competence development, relating learning content to real-life, and collaborative learning).

- In practice, the teachers tend to use traditional teaching methods, emphasizing teacher demonstration and student memorization.

- 61.5% of mathematics and 55% of science teachers believe that the subjects they teach are difficult and only academically competent students should study mathematics and science.

- 46.1% of mathematics teachers and 42% of science teachers think that boys are better at learning the subjects they teach than girls.

- Mathematics and science teachers think the prescribed curriculums are overloaded and there is not enough time allocated to teach it.

- ICT and science teachers expressed confidence in using ICT in their teaching whereas mathematics and English teachers lacked confidence in using ICT for teaching.

- Inadequate integration of ICT in teaching and learning of all subjects was observed.

- 20% of the ICT teachers disagreed that an effective way to learn ICT is by doing projects.

- Among the language skills writing and speaking (communication) are least exercised in the English classroom.

- The teaching and learning in mathematics classes largely focused on procedural knowledge acquisition (steps of solving mathematics problems).

- 69% of the science teachers believe teachers' explanations were the most effective way for students to understand scientific concepts. And 65% of them believe memorizing facts and procedures is most effective for learning science.

- Completing exercises from textbooks was the most frequent learning activity in science classrooms.

- The science teachers were least confident with integrating experiment related activities in their classes.

Policy and practice recommendations

Provide adequate infrastructure, facilities, and resources to improve teaching and learning

The data shows that inadequate infrastructure, facilities, and lack of teaching resources is a prevailing issue in all schools and all subjects. The shortage, unavailability, and outdated resources sets back the teachers' abilities to effectively teach their students. It must provide all students with a textbook for all subjects. It must also provide additional textbooks, teacher guides, well equipped and resourced science laboratories and sufficient ICT infrastructure and equipment to ensure teaching is not limited to transmission of knowledge but facilitates development of the 21st century competencies and prepares students for college, career and citizenship.

Provide all students up to-date textbooks for all subjects

The data from this study shows only in a third of science and English classrooms are textbooks sufficient for students and in less than a tenth of mathematics classrooms does each student have a textbook. The inadequate number of textbooks for students presented a serious problem to teaching and students' learning. Quality textbooks will greatly improve teaching and student learning. Making textbooks available in all subjects in the shortest possible time may require looking at the possibility of using textbooks currently available in the market. This would require a critical reviewing, contextualizing and approving them for use in school.

Update and increase ICT infrastructure and equipment in schools

Improving ICT infrastructure and equipment should be a top priority for the government. The number of computers with internet access in each school needs to be sufficient to support teaching as well as make hands-on experience for the students possible. Sufficient computers with internet access will greatly improve the teaching of 'informatics' and facilitate the teachers of all subject in integrating ICT into their everyday teaching practice as well as designing learning activities for their students to practice and internalize ICT skills. Furthermore, the integration of ICT will allow students to see the interconnections among all the subjects.

Use smart phones for teaching and learning (m-Learning)

It is understood that the funding for schools may be limited, hence updating or purchasing adequate number of computers could be challenging. m-Learning provides a possibility to remedy the issue. As smart phones are prevalent in the homes of all students, exploring the possibility of using m-Learning as a major teaching and learning platform may provide an answer to the issue of lack of ICT resources at school. This would not only facilitate developing students' ICT skills in informatics classrooms, but also truly integrating ICT into the learning of all subjects and realizing the applications of ICT in learning and the everyday lives of the students. Adopting digital teaching and learning resources (e.g., e-textbooks) may also alleviate the problem of textbooks shortage. The digital textbooks and learning materials could be delivered on smart phones. Also, purchasing equipment and materials for conducting experiments in science laboratories is very costly. Computer-based simulations could provide an alternative laboratory experience for the students to conduct experiments in science lessons. Pilot testing the use of smart phones as an ICT platform for teaching and learning in all subjects with a small number of schools is recommended. The pilot testing results can be used to inform a full-scale implementation of this approach.

Improve initial teacher education programmes

The results show that about only two-thirds of the teachers passed the teacher knowledge test conducted by the NTC in Naryn. Among which, physics teachers performed the worst among the teachers of all subjects. Furthermore, the subject knowledge levels among chemistry, mathematics, biology and language teachers varied considerably. As teachers are facilitators of students' learning, research has shown that knowledge and expertise in the subject is an important factor for enhancing students' learning. This study also shows that the teachers use traditional teaching methods, emphasizing teacher demonstration and student memorization. Ensuring teachers have adequate subject knowledge and are skilled in using instructional strategies that facilitate development of 21st century competences

needed for success in college, career and citizenship will require a significant improvement in initial teacher education programmes.

Develop a comprehensive continuing teacher professional development programme

Schools must put in place a policy and comprehensive programme for continuing teacher professional development. This should include induction and mentoring programmes for teachers new to the profession to support and coach them as they learn to navigate the teaching and learning process, facilitate their success in the classroom and their development as teaching professionals. It must also include need-based continuing professional development for all teachers to facilitate adaptation to the changing demands of the profession and provide support and coaching as they make efforts to adapt.

This study shows that teachers need to improve their subject knowledge. Continuing teacher professional development programmes must enhance teachers' subject knowledge. This study also shows that teachers believe in self-directed learning, problem solving competence development, relating learning content to real-life and collaborative learning but do not know how to convert these beliefs into effective practice. Continuing professional development on practical skills of utilizing constructivist pedagogical approaches and strategies is recommended. Teachers qualified in their subject knowledge as well as pedagogical skills will enhance the quality of the students' learning outcomes. The top priorities for teacher professional development are: subject knowledge especially in areas where students are failing; 21st century pedagogies such as project-based learning, collaborative learning, simulations, enquiry-based learning, questioning and discussion; integration of ICT in the teaching and learning of all subjects; and formative and summative assessment (designing authentic assessment to measure student learning). Teacher professional development must include classroom support and coaching to facilitate effective implementation of new learning.

Teacher professional development programmes must also assist teachers in coming to the belief that all children can learn and overcome their gender stereotypes.

Create an educational instruction technology team at district level

Keeping current with ICT knowledge and skills is always a challenge as technology is changing rapidly. It is recommended that an educational instruction technology team be created and in charge of evaluating the latest instructional technology and the most effective utilization of them, disseminating this information to the teachers on a regular basis and providing professional development for the teachers to update themselves on how to integrate ICT in their teaching to enhance student learning.

Section V: STUDENT LEARNING

Introduction

The first part of this section provides important information about the 8th grade students' performance in the National Assessment of Students Educational Achievement (NASEA) in 2017 compared to their performance in 2009 (see box 5 for background information on the test), 11th grade students' performance in the *Obsherespublikanskiy* Test (ORT) (see box 6 for background information on the ORT) and their self-assessment of their various abilities in relation to learning the sciences, mathematics, English, and informatics. The second part of this section focuses on student learning in the classroom and their study habits. A total of 382 students were surveyed and 138 students participated in FGDs to give a general picture of students' learning in as many aspects as possible. These data provide a basic understanding of Kyrgyz students' current learning status.

Student Knowledge

Data from national tests results and self-reports were collected to elucidate the students' current knowledge and skills. Based on NASEA results of the 8th grade students' as well as the ORT results of 11th grade students' for 2016 and 2017, the secondary school students' knowledge and skills on mathematics, reading comprehension, and natural science in Kyrgyzstan can be summarized as follows.

The NASEA test of grade 8 students measure students reading comprehension, natural science and mathematics. In reading comprehension four aspects are assessed: general understanding, interpretation of the text, relationship between reader and text, and the content of the text (e.g. fiction, popular science and official business and instructive papers). For each natural science subject, the following skills and knowledge are assessed. Biology: understanding concepts studied in grades 5–8, ability to find causal relationships between objects of animate and inanimate nature, ability to predict the result of experience and the manifestation of the laws of the science of biology in new conditions, ability to draw conclusions from the results of experience and understanding the value of using appliances. Chemistry: understanding the methods of chemical analysis and their application in various areas of human activity, ability to determine the signs and conditions of chemical reactions and ability to reflect the essence of a chemical reaction by a chemical equation. Physics: ability to apply knowledge of physical concepts and laws to solve problems in a real situation, ability to predict the results of an experiment based on the knowledge of physical laws and ability to explain the result of an experiment based on knowledge of the properties of a substance. In mathematics three areas are assessed. 1.Conceptual understanding of the subject through identification of concepts, their properties and characteristics, ability to apply definition, properties and signs, and ability to use different types of representations of concepts. 2. Procedural literacy, through interpretation of information, choosing the right solution methods, performance of standard procedures and algorithmizing of certain situations. 3. Ability to solve problems through analysis of available information, ability to solve academic problems, and application to real-life.

On assessment students are placed on one of four levels: below basic level, basic level, upper basic level and high level. Students who produce unrelated knowledge; make mistakes in simple tasks; and do not have the knowledge and skills sufficient for further independent successful learning are placed at below basic level. Students who demonstrate basic understanding about the discipline; can complete simple tasks; and have sufficient knowledge and skills to continue education are categorized at basic level. Students who have all the necessary conceptual knowledge; consistently use integrated procedural knowledge to solve tasks or problems; and actively use the acquired knowledge to solve problems of real-life are categorized at upper basic level. And students who have all necessary conceptual knowledge and skills; successfully use the integrated knowledge and skills for solving complex and non-standard tasks; analyze information and make logical conclusions, can explain the process of solving a task step by step; in discussion the students go beyond the scope of the provided information; accurately and consistently express thoughts and bring relevant arguments to defend the presented position are placed in the high level.

6,093 grade 8 students took part in the NASEA and the data of 5,110 is included in the results. The participants are 16.7% of the grade 8 student population in Kyrgyzstan.

Box 5: Information about NASEA of grade 8 students conducted in 2017

On completion of upper secondary school (grade 11) students take the *Obsherespublikanskiy* Test (ORT). The ORT aims to identify students' capability for higher education and results are used to determine the students who will be granted full paid government scholarships for higher education. All students are required to take the main test which includes two subjects, mathematics and language (choice of Kyrgyz or Russian). The mathematics (arithmetic, algebra and geometry) test assesses conceptual understanding, procedural knowledge and problem solving. The language test assesses vocabulary, grammar and reading comprehension. In addition, students can select any 3 subjects relevant to their prospective educational field. For example, students planning to study medicine must take exams in chemistry and biology. The tests are largely focused on assessing students' content knowledge.

A total of 52,039 students took the ORT test in 2016, of which 32,368 students obtained the threshold score of 110 points. And in 2017, 32,540 students from a total 48,449 applicants obtained 110 points.

Box 6: Information about ORT

The improvements made

The eighth-grade students showed an improvement in the 2017 (NASEA) results over 2009 in reading comprehension and natural sciences. Also, the average scores of the ORT for eleventh-grade students were 117.8 in 2017 and 115.4 in 2016 (out of 245) showing a very slight improvement.

Reading comprehension

The most noticeable increase was in reading comprehension. In comparison with 2009, the percentage of students who did not reach the basic level decreased by 15.3%, and the percentage of students at the upper basic level and high level markedly increased by 11.8% in 2017. About half of the students who participated in the assessment reached the basic level, and 31.9% reached upper basic level or high level. It can be assumed that improving reading comprehension skills had a positive impact on students' learning of other subjects as well.

The analysis reveals that the eighth-grade students experience less difficulty in performing reading tasks to solve a practical problem than performing reading tasks for literary education or information gathering.

The eighth-grade students obtained a higher achievement in 2017 than in 2009 in all the natural science subjects except biology. However, the improvement was mainly at the basic level. The number of students achieving upper basic level remained the same as the previous test results. In comparison with 2009, the level of achievement of the eighth-grade students in chemistry grew considerably, but the percentage of students who did not reach the basic level remained high (70%). The most difficult skills for students were identifying the signs and conditions of chemical reactions, formulating chemical equations that describe chemical processes, establishing the dependence of the properties of a substance on its composition and structure, and explaining the composition of a substance with chemical formula.

Areas to be addressed.

Reading comprehension

Though some improvement was made in the 8th graders' reading comprehension competence in a few areas as indicated earlier, the students still struggled with most of the reading comprehension tasks. The most difficult tasks for the 8th grade students were connecting the information in the text with real-life, using the information from the reading to solve practical problems, as well as drawing conclusions from the reading. Also, the students had difficulty in identifying the main idea of the text and generalizing and integrating what was read. Furthermore, explaining what additional information is required to accomplish a specific task as well as understanding the purpose of the information given are also weak areas of the students.

The Natural Sciences

The natural sciences are another area that needs attention. Despite a sizeable decrease (12.6%) in the percentage of students who had not reached the basic level in 2017, the 8th graders' natural science scores were still the lowest among all subjects in NASEA and the second lowest average score (54.1) in the ORT in 2017. Specifically, the NASEA data showed that 76.6% of the students did not reach the basic level throughout the country. Only 4.5% of students reached upper basic level and only 0.4% reached high level. The students' performance was at the same level as 2009 in botany and lower in zoology. It is speculated that one contributing cause is the lack of continuity among the individual parts of the biology curriculum. In terms of chemistry, eighth-grade students' achievements increased compared to 2009. But there were still 70% of the 8th grade students who did not reach basic level.

Despite some improvement in 2017, the most difficult natural science topics for the students are in physics, where about 80% of students did not reach basic level. The results show that practical and laboratory work was not conducted in sufficient quantity and appropriate level for the students to successfully develop their proficiency in the natural sciences. This is not surprising given that the main method of teaching remains listening to teacher's explanations about new concepts and material, reading textbooks and retelling or rewriting information from it.

The students' knowledge and competence development in the natural sciences was slower than in the other two educational areas at school evident in the high percentage of students at below basic level. This reveals science teaching at schools does not equip students with the necessary knowledge and skills required by the state standards and curriculum.

Mathematics

Mathematics was one area that declined in the eighth-grade students' NASEA results. The percentage of students who did not reach basic level was 64.9%, which decreased by 6 points compared to the results from 2009, and the cumulative percent of students at the upper basic level and high level dropped by 5%. The 2017 NASEA result also showed that only one-third of students acquired basic conceptual understanding, procedural knowledge, and skill to solve problems. The students showed the lowest results in the sections 'equations, inequalities and their systems' and 'algebraic expressions'. The eighth-grade students' skill to apply the properties and attributes of various geometric figures and skills to represent the expression of the relationship between quantities were least developed. Mathematics was also the subject that the students obtained the lowest average score (49.7%) in the 2017 NASEA test.

Students reports on own learning

In this study, when students were asked to rate their own abilities in the sciences, mathematics, English and informatics they did so very favorably with between half and two-thirds response to each statement indicating they could do so '*easily or with a bit of effort*'.

The sciences

Two-thirds of students report they would be able to explain '*easily and with a bit of effort*' why earthquakes occur more frequently in some areas than in others (63.6%), predict how changes in the environment affects the survival of certain species (61.0%) and recognize science questions underlying a report on health (66.2%). There were, however, a few tasks that were slightly more difficult for the students. For example, independently discussing how new evidence can lead to change in understanding about the possibility of life on Mars (46.9%) and identifying the better of two explanations about the formation of acid rain (49.2%).

Mathematics

Students generally seem to be less confident of themselves with respect to knowledge and skills in mathematics than in the other subjects: natural sciences, English and informatics. A little over half of the students felt they could '*easily or with a bit of effort*' be able to interpret graphs in the business section of a newspaper (60.2%) or write a simple algebraic equation for the ingredients of a product such as juice (55.3%).

Informatics

Students assessment of their application of ICT skills to everyday tasks such as creating word documents, multimedia presentation and digital learning was high with over two-thirds reporting they could do these tasks '*easily or with a bit of effort*'. 69.9% students held that they would be able to use MS Word to do a homework assignment, 63% could create multimedia presentations and 67.8% could edit a digital photo or other graphic images.

English

In English as well, two-thirds of students report they can read, write and communicate '*easily or with a bit of effort*'. For example, 72% can read a non-textbook story in English, 67.8% can converse in English on an everyday topic, and 61.5% can write an essay in English.

Comparing the self-report and national tests data, the students seem to somewhat overestimate their own academic competence, which is not a complete surprise. However, it might warrant some attention as to helping students have a more accurate self-estimate of their own competence as over-estimating self-competence may cause over-confidence in the subject or topics that they may actually need to strengthen. Furthermore, students' learning outcomes are a result of the interplay of multiple variables that may go beyond the school environment.

Influences on students' academic performance

A few variables that may influence the results of student performance were also examined and are reported as follows.

Location

The schools being surveyed are categorized into three types of schools: Bishkek schools, schools of oblast centers, and small towns and rural schools. Positive changes in different degrees were evident in all types of schools and in all subject areas. Bishkek still occupies the leading position, however, the growth in three oblasts (Issyk-Kul, Talas and Naryn) is more evident in oblast centers and small towns. It can also be seen that the gap between the schools in Bishkek and rural schools is narrowing due to a much lower percentage of students who have not reached the basic level in rural schools. However, the percentage of students at upper basic level and high level is also growing in Bishkek.

As for mathematics, the percentage of students who had not reached the basic level decreased in all oblasts, except for Issyk-Kul, where the achievements remained at the same level as 2009. In mathematics also, the students of the capital showed the highest achievement in test results. The highest increase in mathematics scores was from the students in Osh. This result was a surprise because Osh was one of the oblasts that obtained the lowest score in mathematics in 2009. However, despite the improved results, overall Osh, Jalal-Abad and Batken oblasts showed the lowest results.

Students in Bishkek schools were also the best performers in reading comprehension. 75% of Bishkek's eight-grade students reached the basic level and upper basic level. All oblasts showed improvement in reading compared to 2009, and these improvements were not only at the basic level, but also upper basic level and high level. The students of Osh also showed growth in their reading comprehension skills. Osh, Jalal-Abad and Batken oblasts obtained the lowest test scores.

All regions showed a noticeable increase in the test results of natural sciences at the basic level, with no obvious change at the upper basic level. The students of schools in Osh oblast showed particularly intensive improvement of results at the basic level. Despite the positive changes, the students' performance in the natural sciences remained lower than desired. The percentage of students at below basic level exceeds 80% of the student body in Osh, Jalal-Abad and Batken oblasts.

Instructional language

Similar to the test results from 2009, students of Russian-language schools showed the highest results at all levels and in all subjects in 2017. However, the percentage of students of Kyrgyz-language schools who did not reach the basic level has noticeably decreased.

Progress at upper basic level and high level was also made at Russian-language schools. There were also positives changes in Uzbek-language schools mainly due to a decrease in the percentage of students who did not reach the basic level. However, this percentage was still extremely high in all three subject areas: in mathematics (78%), reading (72%), and the natural sciences (81%).

Gender

The girls' test results in mathematics were slightly higher than the boys in 2017. But as compared to 2009 the improvement in results is slightly more noticeable among the boys. In reading comprehension, the girls were further ahead of the boys at all levels of achievement in 2017. In natural sciences, girls and boys showed equal results in 2017.

School system

The performance of private school students on the test throughout the country are much better than that of public school students. The biggest difference was in mathematics and reading. Among 8th graders at private schools, only 29% of them did not reach basic level in mathematics and 8% of them did not reach the basic level in reading comprehension, while the percentages of their counterparts in public schools were 38% and 36%, respectively.

Student Learning in the classroom

Students rating on the frequency of some activities in their English, informatics, science and mathematics lessons show that students are much more frequently engaged in lower order thinking activities than in higher order thinking ones. For example, students more frequently read and answer questions from the textbook in science than conduct experiments and draw conclusions. They learn new vocabulary and grammar in English more frequently than write creatively. In mathematics they observe teachers demonstrating how to solve problems more often than explaining how they solved problems. They observe teachers demonstrate and practice ICT skill in informatics much more frequently than using their ICT skills for real-world applications such as browsing the internet or using spreadsheets to plot graphs.

Science

Students report that in (*all & most lessons*) science lessons, they simply read from the science textbook and answer the given questions (79.1%). In only about half of the lessons, they argue about science questions and investigations (56%). In only '*a few lessons and never*' do students engage in learning tasks that require them to conduct given experiments, write observation and draw conclusions (54%), design and conduct their own experiments (66.2%), work on extended projects (62.6%), watch science related videos (67.2%) and communicate orally or in writing on science topics and investigations (52.1%). The student reports indicate that learning in science lessons follow a behavioristic rather than a constructivist approach so that learning is receiving information rather than learning by doing.

English

Students report that learning vocabulary, grammar, practicing reading and listening comprehension and discussing stories and expressing opinions on texts are the main learning tasks in English lessons (high percentages *in all lessons*, 52.1%, 41.6%, 40.1% & 40.1%, 39%, 37.7% respectively). Writing creatively and working in groups are learning tasks students less frequently engage in (*in all lessons* 18.3% & 23% respectively.)

Mathematics

Students state that observing teachers demonstrating problem solving procedures and explaining math concepts are the most common learning tasks in mathematics lessons (66.5% & 55.8% *in all lessons*, respectively). They are fairly regularly required to explain how they solve problems and justify their choice of problem-solving method (49.7% *in all lessons*). In about a third of *all lessons* they engage in learning tasks that require them to apply mathematics to real-life (35.3%), make connections between concepts in mathematics and other subjects (31.7%) and use multiple representations to communicate concepts in mathematics (38.5%). The students' reports also indicate that they work in groups considerably less than individually in mathematics classes: 18.8% versus 47.9% *in all lessons.*

Informatics

According to the students the most common learning tasks in informatics lessons (*in all & most lessons*), are observing the teacher demonstrate the ICT skills (82.6%) and practicing them (77.5%) as well as learning programme languages (72.7%). They spend considerably less time on real-world applications such as learning how to use power point (57.9%), coding (56.2%), browsing the internet (55.8%), using spreadsheets to plot graphs (54.2%) and developing databases (39.2%). Though it is important to demonstrate the procedures of various ICT skills or tasks, ample amount of practice and real-world application opportunities are the key to students' successful development of these ICT competences, which was lacking considerably in the students' informatics classroom learning experience. Even in informatics lessons, 10.2% of the students reported that computers were never used.

From the students' perspective, use of the computer was not a common practice in science, mathematics and English classes. 55.2%, 66.5%, and 61.0% of the students report that computers were never used in their science, mathematics, and English classes, respectively. Less than 14% used computers regularly in class.

On, average, 47% of the teachers use computers to facilitate student learning, 57% use the internet and about 27% use email for educational purposes.

Student learning out-of-the-classroom

Important to student learning is not just what and how they learn in the classroom, but also what and how they learn out-of-school. This section reviews students' after-school learning.

Hours spent studying

In addition to the 30-36 hours students spend learning in their classrooms, about half to two-thirds of the students' report spending additional time in after-school enrichment and/or

remedial classes: mathematics 32% and 34%, science 21% and 28%, English 32% and 37, other subjects 31% and 34% respectively. They also spend many additional hours each week out-of-school learning mathematics, science, English and informatics. About half of the students report they spend between *1-5 hours* each week studying each of the subjects: mathematics (63%), science (59%), English (55%), informatics (41%). However, the data also shows that some students (14-16%) do not (*0 hours*) study science (15%), math (14%,), or English (16%) after school and a high percentage of students (40%) do not study informatics after-school. It is possible that teachers and students do not see informatics as a subject that needs to be 'studied'.

How students learn

The students' reports of their learning behavior (*always & often*) show that they tend to use both passive and active learning strategies. Most often they try to memorize as many details as possible (78.8%) and memorize the most important points (89.8%). But as frequently they also seek to identify what they need to learn (86.7%), which concepts they understand and which they do not (78.2%), and to find additional information to further their understanding (83.2%). Less often do they try to relate new information to the materials previously learned (70.7%) and relate the concepts from the textbook to real-life situations (70.3%). The students need to be guided to change their studying behavior to conceptual and contextual learning. Also, these studying behaviors have a direct relationship with how the teachers model learning behaviors as well as the nature of the assignments they give students.

Use of the school library

All the schools have libraries. Students were asked how often and for what purpose they use the library. Students use the library most frequently to borrow books for schoolwork (20.4% *weekly*, 36.4% *monthly*) and to borrow books to read for pleasure (31.9% *weekly*, 28.0% *monthly*). Students '*never or hardly ever*' use the library to browse the internet for information (48.7%) or to read newspapers and magazines (45.3%). This very minimal use of the school library for learning most likely reflects the lack of or insufficient resources available in the libraries.

Use of school and home computers for learning

The data shows that all schools have computers. However, 14.4% of the students report that they have never used a computer.

Students were asked to indicate what ICT devices were available for them at school and to indicate if they used them or no. The students report that there are desktop computers (94.5%) and some portable devices (38%) which are connected to the internet (83.8%) available to them at school. They also have access to printers (86.4%) and USBs (86.9%). 73.3% of students report using the desktop computers and 38% the portable devices, with 50.3% using these devices to connect to the internet. There is some use of the school printers (46.6%) and USBs (41.9%). It is most likely that much of this availability and use of ICT equipment is in the computer labs during their informatics lessons.

The students were also asked to report on the frequency with which they use their school computers for various learning tasks. The students' reports reveal that students generally make little use of their school computers. They use it most frequently to browse the internet

(*daily* 11.7%, *weekly* 21.8%) and do homework (*daily* 13.2%, *weekly* 18.5%). Most students report '*never or hardly ever*' using their school computers to download material from the school website (57.4%), chat online (62.4%), send emails (59.8%), do group work and communicate with other students (41.2%) and practice mathematics or learn languages (40.7%).

Students limited use of their school computers could be due to the inadequate number of computers available for them at school or inadequate integration of ICT in the instruction at school.

The students' use their computers at home more frequently than the computers at school for learning. They use their home computers most often for doing their homework (*daily* 27.9%, *weekly* 23.1%) and schoolwork (*daily* 25.7%, *weekly* 21.7%). They '*never or hardly ever*' publish or maintain a website (52.4%), download materials from the school website (49.5%), chat online (41.4%), send emails (43%), or participate in online forums (37.7%).
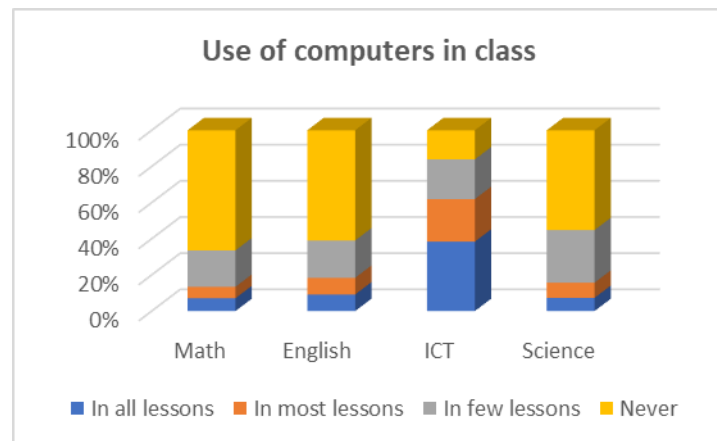
Figure 9: Use of computers in class for each subject

The school administrators, however, have quite a different perception from the teachers and the students vis-à-vis the use of ICT in teaching and learning in their schools. They were optimistic about their students' use of ICT. They noted that the following computer related activities are part of students' assignments at least *once a month*. Over 90% of the school directors report that their students can operate a computer to save files and print or make illustrations with graphical programmes, and 80% that their students use educational software to complete exercises or take tests. More than two-thirds of the school directors report that their students were able to work with digital technologies to gather information and communicate with others using email. Programming was the least reported ICT activity by the school directors (55%). However, these data do not seem to be realistic given the highly inadequate infrastructure, facilities, and teaching and learning resources reported by school directors, teachers, and students. Interpreting the data with caution is recommended.

The school directors were also asked to indicate the frequency with which computers are used to facilitate learning. They indicate that computers are used '*a lot*' to obtain information from the internet (90%). They also report that computers are used to help students develop skills of independent learning (60%) and to allow students to learn at their own pace (50%). A high use of computers for computer-based simulation for learning (35%) and for multidisciplinary learning (30%) is also reported by the school directors. Again, this report does not seem to be consistent with the data from the students or teachers, or the resources data. It is doubtful that the students from most schools (94%) would be able to frequently use computers to obtain information from the internet, while the inadequacy of ICT equipment and resources was a common theme in the teachers' report as well as the students. With the

student to computer ratio ranging from 28.24 students per computer to 200 students per computer, the teachers and students' reports seem to be more realistic than the school directors. The school directors did admit that lack or inadequacy of ICT infrastructure and resources was problematic for their schools. They report lack or inadequacy of computers (41%), internet connectivity (47%) and educational software (35%) are hindering the quality of teaching and learning in their schools.

Motivation to learn (general and subject specific)

Research shows that motivation to learn is central to students' success. Students were asked to agree or disagree with statements about their motivation to learn both intrinsically (learn because it is self-satisfying) and instrumentally (learn for a practical reason such as to get a job or admission into university). They show both high intrinsic and instrumental motivation to learn.

Enjoyment of learning

Students '*strongly agree and agree*' with the following statements regarding learning in their science, English, mathematics, and informatics classes. They report:

Sciences: I generally have fun when I learn new topics in science classes (91.6%), I like to work on new topics in science classes (86.9%), I enjoy acquiring new knowledge in science classes (86.4%), and I am interested in learning new skills in science classes (87.9%).

English: I generally have fun when I learn new topics in English classes (87.5%) I like to work on new topics in English classes (86.4%), I enjoy acquiring new knowledge in English classes (84.5%), and I am interested in learning new skills in English classes (87.1%),

Mathematics: I generally have fun when I learn new topics in mathematics classes (89.5 %), I like to work on new topics in mathematics classes (mathematics 85.1%), I enjoy acquiring new knowledge in mathematics classes (84.1%), and I am interested in learning new skills in mathematics classes (89%).

Informatics: I generally have fun when I learn new topics in informatics classes (91.6%) I like to work on new topics in informatics classes (88 %), I enjoy acquiring new knowledge in informatics classes (87.6%), and I am interested in learning new skills in informatics classes (89.6%).

Learning for success

Students '*strongly agree and agree*' with the statements regarding making efforts to learn in their science, English, mathematics and informatics classes because these efforts would facilitate them in obtaining higher education and getting jobs. They state:

Sciences: Making efforts in science classes is worth it because it will help me in what I will do later (85.6%), and what I learn in science classes is worth it because it will help me in my further studies (87.9%).

English: Making efforts in English classes is worth it because it will help me in what I will do later (89%), and what I learn in English classes is worth it because it will help me in my further studies (90.6%).

Mathematics: Making efforts in mathematics classes is worth it because it will help me in what I will do later (90.6%), and what I learn in mathematics classes is worth it because it will help me in my further studies (90.3%).

Informatics: Making efforts in informatics classes is worth it because it will help me in what I will do later (90%), and what I learn in informatics classes is worth it because it will help me in my further studies (90.9%).

The data reveals that students have strong intrinsic and instrumental motivation to learn. Teachers would do well to direct this motivation by encouraging students to persevere in acquiring new knowledge and skills, maintaining their involvement in learning, encouraging confidence in their abilities to perform specific tasks and recognizing and praising their success (Malone & Smith, cited in Meyer et al., 2008). It is also important for teachers to connect what students are learning to real-world issues that matter to them as research shows that when this is done 'their motivation soars, and so does their learning' (P21, 2007b).

Educational and career expectations

Students have high expectations and a very positive outlook for their future education as well as career. Overall, 78% of the students expect to receive at least a university level of education. For example, the percentages of the students who expect to obtain a bachelor's degree, master's degree, and doctoral degree are 49.7%, 14.9%, and 13.4%, respectively. More than 90% of the students (*strongly agree & agree)* want the best in their future education and job opportunities. 92% want high grades, 93% want to be best in their class, 97% want to have the opportunity to select the best university or job after completing school, and 90% want to be best in whatever they do. This high self-expectation could provide a base for motivating students to improve themselves and develop the necessary competences to achieve their educational goals.
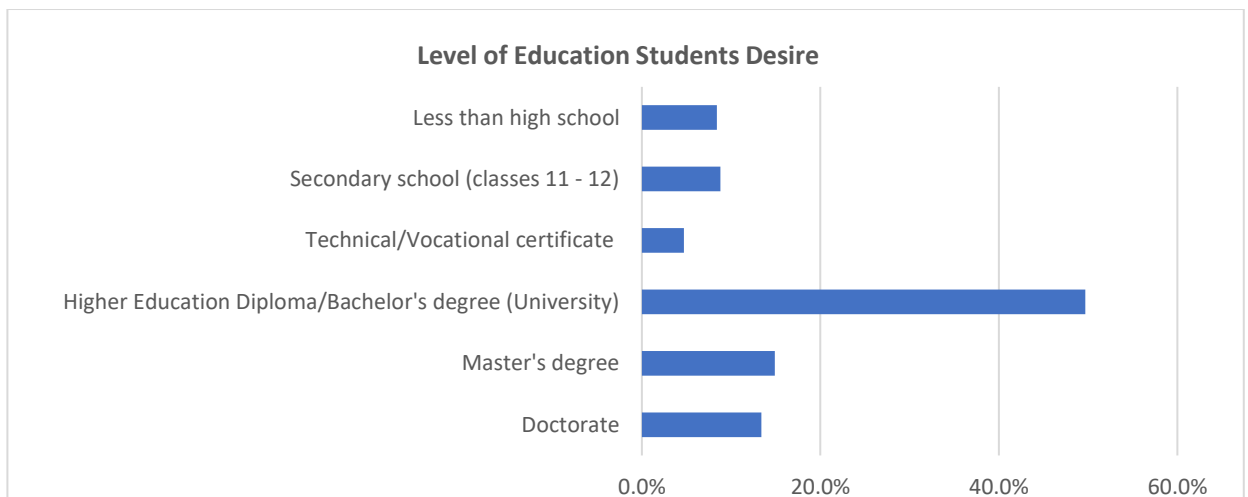
Figure 10: Level of education students expect to achieve

In terms of their career outlook and planning, most students (89.5%) identified their job at age 30. Health care professionals is the highest (28.3%) choice of the students, followed by ICT professionals (9.4%), education professionals (teachers 7.9%), finance/banking professionals (7.9%), closely followed by entrepreneurs (5.8%), linguist/translator (5.8%) and science and engineering professionals (5.5%). The students show high interest in careers

in healthcare and somewhat lower interest in careers in ICT and science and engineering. This interest shows an alignment between promoting STEM, ICT and English competence of students and their career outlook.

Nurturing future scientists: The role of skills and motivations

The students' expectations of their future education and career show a promising outlook for themselves, as well as the country's future workforce. Taping into the students' interests in healthcare and ICT professions, the schools should encourage the students to work towards their goal. At the same time, the schools should also provide sufficient support for the students' acquiring the necessary skills to enter the workforce in the science and engineering professions. STEM, ICT, and English and the 21st century skills would be the most essential for the students to enter the related majors in higher education settings, and eventually become part of 21st century workforce in Kyrgyzstan.

Factors supporting and hindering learning

The school directors were asked to identify the extent to which student learning is hindered by student and teacher factors. According to the school directors, teachers not being well prepared for classes (75%) was the most important factor hindering student learning followed by teachers being too strict with students (70%). Many school directors felt that teachers not meeting students' needs (65%) and having low expectations (60%) were also contributing factors.

The school directors report student absenteeism (75%) and students skipping classes as the key student factor hindering learning. Moreover, 23% of the students reported missing a whole day at school, 26% of them missing some classes, and 30% of them being tardy once a week. These student absence rates are high and present a problem for their learning. Because if students do not come to school or do not attend classes, they would find it more difficult to learn.
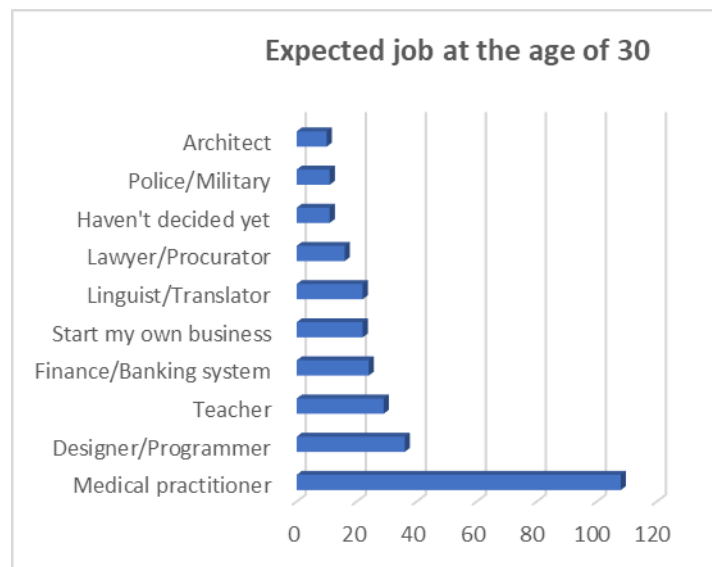
Figure 11: Students' desired job at the age of 30

The data from this study however reveals that there are other teaching factors as well as school factors such as high percentages of class cancellations or lesson interruption that hinder students learning. 18% of students report school was closed, 41% indicate some lessons were cancelled, 26% a teacher missed lessons and 5% teachers' strike. Furthermore, they report many class interruptions: 53% teachers being called to meetings and leaving the class, 33% teachers coming late for class, and 33% teachers doing personal work during class. Such high percentages of school or class cancelations or interruptions will definitely have a negative impact on students' learning. Examining these two sources of learning disruption,

class cancellations and lesson interruptions, the class cancellation appears to be much more serious than the other. High class cancellation rate and lesson interruptions due to teachers being called away to fulfill administrative duties, may be more detrimental than any of the issues discussed in this report. The school directors would be largely responsible for such cancellations and interruptions. They should seek to reduce class cancelation to a minimum and better schedule teachers' administrative duties to avoid such a negative impact on the students' learning.

The main supporting factor is the high motivation levels of the students to achieve and realize their dreams of obtaining a higher education and securing good jobs. It is important that the high motivation of students be directed towards them developing the competencies required for success in higher education, work and life.

Summary

The eighth-grade students showed an increase in the results of 2017 NASEA in reading comprehension and the natural sciences. The most noticeable increase was in reading comprehension. Although they were improvements in the natural sciences, 80% of students did not reach basic level in physics and 70% did not reach basic level in chemistry. In biology, students remained at the same level in botany but scored lower in zoology. Mathematics was one area that declined with 64.9% students not reaching basic level as compared to 2009 when the result was 70.9% showing a decrease of 6 percentage points.

In most of the classes in all the subjects a more behavioristic than constructivist approach to learning is evident. The most frequent activity in science classes is reading from the textbook and answering the given questions while the least frequent are conducting experiments and investigations. In English, learning vocabulary and grammar are the main activities while speaking and writing creatively is seldom done. Teachers demonstrating how to solve problems is the most common activity in mathematics classes while the least common is using multiple representations to communicate concepts in mathematics. In informatics classes students generally observe teachers demonstrate ICT skills and then practice them but get fewer opportunities to apply their skills in real-world contexts. Students spend a lot of time studying, have high intrinsic and instrumental motivation, have high levels of self-efficacy as well as high educational and career expectations. Teachers need to model effective studying habits, give students challenging tasks and use their high levels of motivation and educational and career expectations to enhance their performance and achievement. Teachers also need to attend school regularly and be well-prepared for every lesson if there is to be quality teaching and learning.

Key Findings and Policy and Practice Recommendations

Key findings

- The eighth-grade students showed an improvement in the NASEA results of 2017 in reading comprehension and the natural sciences.

- The most noticeable increase in the students' test scores was in reading comprehension, however, students found it difficult to use the information read to solve practical problems or draw conclusions.

- The most difficult natural science subject for the students was physics where 80% of students did not reach the basic level. The most difficult tasks in physics for the students were understanding and working with charts/graphs/tables; distinguishing between types of energy and how energy changes; drawing conclusions from given conditions or experiment descriptions. Although student achievement improved in chemistry, the percentage of students who did not reach the basic level was a high 70%. The most difficult tasks in chemistry were identifying the signs and conditions of chemical reactions, formulating chemical equations, establishing the dependence of the properties of a substance on its composition and structure, and explaining the composition of a substance with its chemical formula. In biology, the students' performance remained the same in botany but was lower in zoology.

- The eight-grade students made minute improvements in responding to open-ended questions in all subjects in the 2017 NASEA but results show it is the most difficult task for them. Students have not yet developed adequate skills to independently formulate thoughts, provide evidence and examples, and draw conclusions.

- Students performance is affected by location, instructional language, gender and school system.

- Learning in classrooms is still largely information transmission rather than learning by doing. Learning is more individual than collaborative. Students hardly ever work on extended projects. There is little discussion, questioning and application of knowledge to the real-world.

- Memorization is still the dominant learning strategy among the students.

- Students are inadequately exposed to ICT technology and use it infrequently for learning.

- Students positive attitude toward learning and future education and career outlook are supportive of learning.

- There are teacher, student and school factors that hinder student learning. Teacher factors include teacher absenteeism, not being well-prepared for classes, not meeting students' needs and low expectations. Student factors include absenteeism, skipping classes and tardiness. School factors include school and class cancellations and interruptions caused by teachers being called out of class.

Policy and Practice recommendations

Share the findings of the NASEA, set goals for student achievement and facilitate their realization

Although the students' scores on the national tests increased variably in different subjects, in general, there is still a long way to go for the students to reach an acceptable level of academic achievement. It is recommended to share the findings of the NASEA widely, set goals for students' achievement in each subject and facilitate realization of the goals. For example, set the goal for all to reach basic level and 65% to reach upper basic level within the next three years.

Support disadvantaged schools and students

The data shows that location and instructional language impact student performance. A policy and programme of action to improve the provision of education in small towns and rural schools and to Kyrgyz-language schools to improve the quality of education in these schools should be developed and implemented to enable them to achieve the goals set for student achievement three years hence.

Teach and model new study habits

The data shows that students use passive learning strategies such as memorization rather than going through a deep conceptualization process and relating what they learned to real-world situations. This learning behavior might be largely responsible for the students' difficulty in improving their performance. The teachers need to model more active, conceptual and contextual learning strategies for students to observe, follow, and internalize. Moreover, in-class activities as well as homework assignments, must require students to engage in higher order thinking and authentic learning which require them to use these new learning strategies to perform tasks similar to those they encounter in the real-world and will encounter in the workplace.

Facilitate students use of ICT skills for learning and life

According to the data, the learning in ICT classes predominately consists of students watching the teachers' demonstrations of computer applications and practicing the steps of the procedures. Real-world applications are normally not the focus of ICT classes. As a result, students see the subject of informatics as something that they have to study but not something that will have an impact on their future education, career and personal lives. Teaching and learning in the informatics class should focus on real-world applications of the ICT tools. More importantly, the relevance of learning the ICT skills should be made explicit for the students. Furthermore, all teachers should design assignments and projects requiring the use of ICT to engage in deep learning and independent and collaborative problem-solving.

Change the system of assessment

Research shows that 'whatever is measured matters' (Binkley, et al., 2012). The focus on transmission of knowledge and memorization will continue in a system where tests and examinations require regurgitation of textbook information, and where results of which determine entrance to university and potential jobs. A new assessment system is required to align with the educational goals outlined in the SSE which identifies the competencies to be developed and the learning outcomes to be achieved. Moreover, the SSE delineates a more constructivist approach to teaching and learning focusing on project-based learning, enquiry learning and collaboration. These pedagogical approaches require students to work collaboratively, apply their learning to real-world problems and share their learning with authentic audiences. Assessment of these competencies would best be accomplished by broadening the range of knowledge and skills to be assessed and using a variety of metrics.

Use students' positive attitude and high motivation to guide them to higher achievement and to careers in STEM, ICT and English

Students showed very positive attitudes toward learning, relatively high level of self-efficacy in their performance and high expectations for their education and career. Having a goal for the future could direct and motivate students to do what is necessary to reach the goal. This positive attitude of students presents a great opportunity for guiding and motivating students toward studying STEM, English, and ICT as well as improving their learning in general. It is recommended to use real-world problems to trigger students' interests to study the subjects, as well as motivate them towards their targeted future education and career. Linking what and how the knowledge in STEM, English, and ICT and the 21st century skills are used and required in their desired professions will make learning more relevant and meaningful and motivate them to develop the knowledge and skills required for higher education achievement and entry into their professions of choice.

Establish partnerships with companies and social enterprises to facilitate workplace learning

Establish partnership with business or social enterprises where the students of grades 10-11 could have short-term internship opportunities. These business or social enterprises could be encouraged to have 'open house' when students could come for a day visit and get a first-hand look at the world of work. They could also support 'take your child to work' day, where parents take their children to work to give them the opportunity to see the work people in various professions do.

Do away with the 'Stavka' system and base teachers' remuneration on all the pedagogical work they must do to ensure quality learning and high student achievement

75% of school directors believe that a key factor hindering learning is the fact that teachers are not well-prepared for their lessons. This is probably due to the 'Stavka' system of remuneration which pays teachers for actual teaching and checking students copies. This practice does not take into account all the pedagogical work teachers must engage in. In a competence-based education system teachers need to design their own units and projects that highlight the real-world relevance of subject topics, develop teaching and learning materials and formative and summative assessment tools, to be ready to offer relevant, effective and high-quality learning experiences for the students. They need time to reflect on their teaching, build more collaborative relationships with their colleagues (e.g. develop and implement cross disciplinary projects) as well as with people and organizations within their communities (to support real-world applications). A new remuneration system that takes into account all the pedagogical work of teachers is required.

Encourage students to be regular

Students report a high absenteeism, skipping classes and tardiness. It is essential that school directors share these findings with parents, indicate the detrimental effects on student learning and encourage them to ensure their children come regularly and on time to school.

Section VI: STUDENTS WELL-BEING

Introduction

Well-being is defined as the psychological, cognitive, social and physical capabilities that students need to live happy and fulfilling lives not just in the future but 'here and now' (PISA 2017, p. 60). Psychological well-being includes students' life satisfaction, sense of purpose, self-awareness and absence of emotional problems. Physical well-being is adopting a healthy lifestyle and overall health. Cognitive well-being is students' proficiency to apply what they know to solve problems and social well-being is related to students' relationship with family, peers and teachers as well as feelings about their social life. Research shows that students well-being facilitates academic achievement. Positive relationship has been shown between emotional and psychological well-being and academic achievement (Grable, 2017).
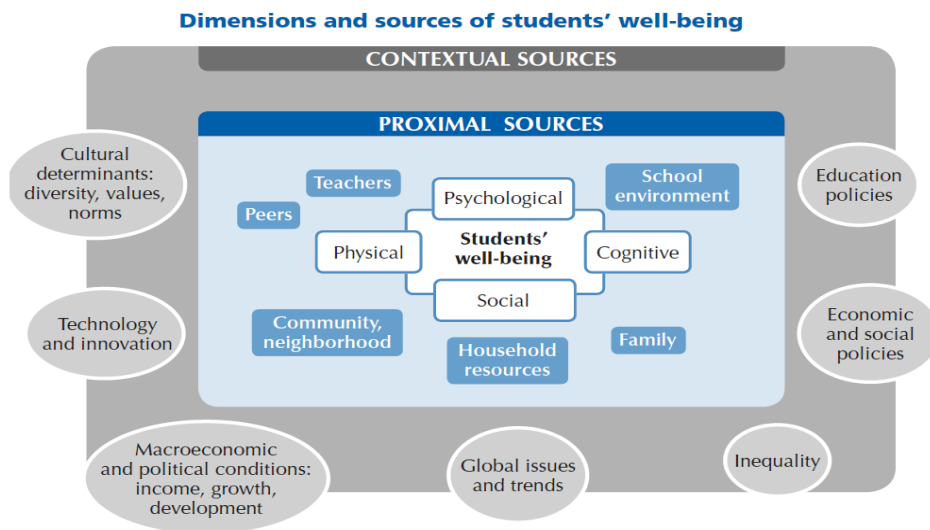
Figure 12: Dimensions and sources of students' well-being (PISA 2017, p. 62)

The students participating in this study were asked questions about the various dimensions of their life, as well as their perception about their lives in general and in schools specifically. This information provides a more complete picture about the factors that might contribute to the students' well-being and consequently their academic performance.

Performance at school and life satisfaction

School work related anxiety

Pressure to obtain high grades and concerns about poor grades are often sources of anxiety and stress cited by adolescents. High levels of school related anxiety can have a negative effect on student achievement. The students in this survey (*strongly agree & agree*) show a

moderate level of schoolwork related anxiety and stress. About half of them worry about obtaining poor grades (49%) and taking tests that may be too difficult for them (51%). About two-thirds of them are concerned they would be unable to solve problems (63%).

Students motivation to achieve

Research shows that motivated students do better at school. They are highly satisfied, show greater resilience and are more tenacious in the face of academic challenges (PISA, 2017) The students in this study demonstrate a high motivation to achieve. They (*strongly agree & agree*) that they want to be the best in class (93%), want high grades (92%), want to be able to select the best university or job (97%), and to be the best in all things (90%).

Students expectation of future education

The students in this study also have high expectations of their future education. Overall, 78% of them expect to receive a university level of education. 49.7% expect to obtain a bachelor's degree, 14.9% a master's degree and 13.4% a doctoral degree. They also have high career expectations and most of them envision themselves in a job of their choice by age 30. In addition, 90% of them report wanting the best in their future education and job opportunities.

Students social life at school

Research shows that students who feel part of the school community perform better academically, are more motivated to learn and are less likely to engage in risky or antisocial behavior. Students were asked to agree or disagree with statements regarding their liking for their school, their peers and their teachers. Most students have very positive perceptions (*strongly agree & agree*) about their social lives at school reporting positive relationships with their teachers and peers. 90% report they make friends easily, 86% their teachers like them and 89% their peers like them. Furthermore, 81% claim they are involved in decision making at school about things that affect them.

Students sense of belonging at school

Sense of belonging at school is defined as the development of personal identification and a social identity by being a member of the school. Common attributes are positive emotions (e.g., attachment, intimacy, usefulness, support and a sense of pride), positive relationships with peers and teachers (e.g., encouragement, acceptance, support, respect, warmth and valorization), a willingness to get involved meaningfully with the group (e.g., active participation in co-curricular activities) and harmonization, that is a willingness to adapt or adjust by changing personal aspects to align with situations or people.

Students' attachment and sense of pride in their school

96% of students report they like to go to school. This liking for school is probably influenced by the fact that their teachers and peers like them and the school involves them in making decisions about things that affect them such as choosing the elective subjects that the school will offer.

Similar to the findings from the survey, the students in the focus group discussions, also state they like their schools. They like the atmosphere in the school, the school programme, their peers and their teachers. The students express an attachment to and sense of pride in their

school because, 'the level of education, especially in English, math and Russian is better as compared to other schools, the teachers are good, and the school is prestigious' (Student school A).

Students' relationship with their teachers

Students were asked to agree or disagree with statements regarding their teachers' behavior and attitude towards them. Students' responses (*strongly agree & agree*) indicate most of them have a very positive perception of their teachers. An overwhelming 93% report they get along with most of their teachers. With respect to their teachers' attitude towards them, students state most of the teachers show an interest in their learning (82%), are interested in their well-being (70%), listen to what they have to say (85%) and give them the opportunity to express their opinion (88%). The students are also very positive about their teachers' responses to their needs in the classroom and more generally. They assert most teachers encourage them to do their best (87%), most teachers continue teaching until they understand (82%), if they need extra support, they get it from most of their teachers (75%) and most teachers treat them fairly (87%).

Teachers' responses are very similar, albeit higher than those provided by students when asked about their relationship with their students. Teachers report (*strongly agree & agree*) there is mutual respect and trust between them and their students (98%), they are interested in what students have to say (92%), they provide extra assistance to students who require it (99%), they motivate students to learn (99%) and cultivate creativity and innovation in their classrooms (95%).

When asked specifically about their teachers' treatment of them compared to their classmates over the last year, the students also had positive perceptions of their teachers' fairness towards them with respect to grading and in disciplinary matters reporting '*a few times a year and never'* to the following statements. My teachers graded me harder than other students (70%), my teachers gave me the impression I was less smart than my colleagues (87%), my teachers disciplined me more harshly than my colleagues (83%), and my teachers insulted me in front of other students (94%). The data show that the only area in which students felt their teachers' treatment was not fair was in calling on them less than their classmates (46%). This was also often observed in the lessons with teachers calling frequently on some students while ignoring other students, even those who raised their hands to volunteer an answer.

Student relationship with their peers

Students were asked to agree or disagree with statements regarding their relations with their peers at school and how often they were bullied by other students over the last twelve months.

Similar to their relationship with their teachers, the students report very positive relationships with other students at school. 83% of them claim they '*always*' treat each other with respect and 82% they '*always*' help each other even if they are not friends. With respect to being bullied at school, an extraordinary 92% of the students indicate that over the last year their peers '*never*' made fun of them. 97% report they were '*never*' threatened by other students, 94% indicate other students '*never*' took away or destroyed my belongings, 96% claim other students '*never*' hit or pushed me, and 80% state other students '*never*' spread nasty rumors about me.

Students participation in co-curricular activities

The school directors and teachers report that the schools offer a range of co-curricular activities for students. These include subject enrichment (including preparation for Olympiads) and remedial programmes, sports programmes (e.g. soccar, judo) artistic and cultural activities (e.g. music, dancing, arts and handicrafts) and community service activities (e.g. community clean ups, assistance to elderly people). Students report they participate in enrichment and remedial programmes offered at school both before (31.2%) and after (52.4%) school. They also participate in sports both before (52.9%) and after (58.6%) school. Moreover, all schools offer and it is compulsory for all students to participate in the community service programmeme of the school. There seems to be less participation in cultural and artistic activities at school, with only three-fourths (78.9%) of school directors stating they offer such activities and teachers reporting these activities occurring less often (21% *once a quarter*, 21% *once a year* and 11% *never*) than all the other kinds of activities.

Students satisfaction with life

Students were asked to state how satisfied they were with life. 68.3% indicated they were very satisfied, 17.8% satisfied, 13.4% somewhat satisfied and .5% not satisfied. It is quite possible that students satisfaction with their lives is partly due to their strong sense of belonging and satisfaction at school.

Home Environment and Parent involvement

Parental interest in their child's home and school life

There is a high level of parental involvement in students' lives. Parents' strong presence and engagement in their children's lives at home as well as at school is an asset in the equation of an education system. The parents care about their children's well-being as well as their academic performance and are willing to get involved in their children's school as much as they can.

We asked students how often your parents spend time in everyday home activities with you and discuss what you do at school. From the students' responses (*strongly agree & agree*) it is evident that parents play an active role in their children's lives at home. An overwhelming majority of students report their parents spend time eating meals together with them every day (92%) and spend time simply talking to them every day (82%). In addition, students' report their parents take a very active interest in their lives at school. Students report their parents '*daily and weekly'* not only inquire about what they did at school that day (85%), but also encourage them to get good grades (84%), encourage them to complete secondary school (78%), and encourage them to obtain further education (77%). Their parents also ask them about what they are learning at school (76%) and discuss their performance with them (79%). Students indicate that their parents' interest in their lives at school is not limited to their learning and academic performance but also includes attention to the areas that have an impact on their social and emotional well-being. Students report parents ask them about their relationship with their peers (69%) and discuss any problems they might have had at school that day (65%).

Wealth and social status

Students were asked several questions to assess their wealth and social status as socio-economic status is known to impact student achievement. The first set of questions included: How many people live at home with you and who they are? What is the highest level of education completed by your mother? Your father? If your mother and father is working, what is her/his main job?

The average number of people that live in the students' homes is 6. Most students live with both their parents (88% mother and 76% father) and siblings. 26% of students also have their grandparents living with them. According to the data, the parents' education levels vary from master's degree to less than grade 4. Most parents (83.5% mothers and 77% fathers) have obtained a secondary school or higher education qualification. Of the mothers, 28.3% have a secondary school certificate, 16.2% a TVET college certificate and 39% a Higher Education Diploma. Like the mothers, the fathers' education qualifications include 24.9% a secondary school certificate, 19.4% a TVET college certificate and 32.7% a Higher Education Diploma.

52% of mothers work full-time and 9.2% work part-time and 54.2% of fathers work full-time and 11.3% work part-time. Their mothers are professionals or associate professionals in education (teaching 15.2%), business and trade (13.3%), the service sector (12.6%), health care (7.6%) and science and engineering (2.2%). Their fathers are professionals and associate professionals in science and engineering (14.9%), business and trade (11.2%), farming (9.2%), the services (7.3%), education (teachers 4.2%) and management (3%). The gender difference in the parents' professions is notable. Most mothers are in the teaching profession and the least are in professions in science and engineering, whereas most fathers' professions are in the fields of science and engineering while the least are in education. This gender difference in professions is important as it may influence the career choices of male and female students with respect to the STEM professions.

Students were also asked if their family owned the home they live in and the type of house. They were also asked to indicate the things in their home. Most of the students' families owned their own homes (92.4%). 79.1% live in detached houses and 20.9% live in apartments. 84.6% report their families own additional land.
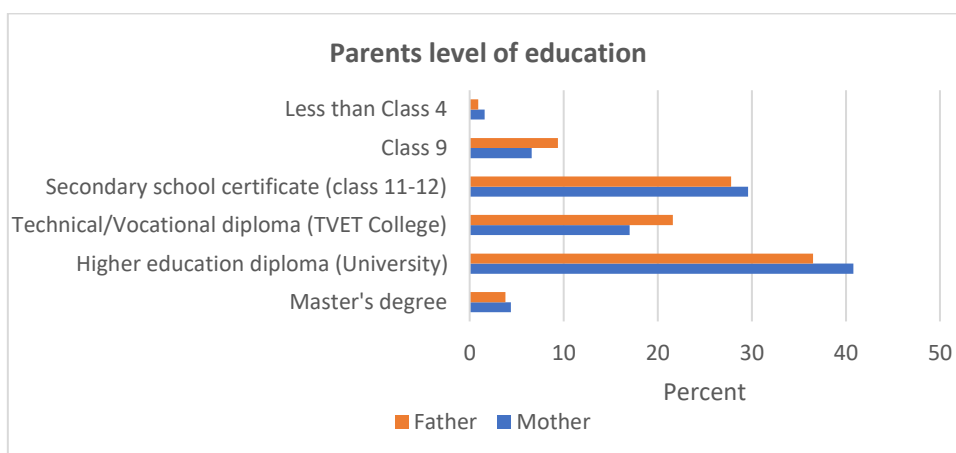
Figure 13: Parents level of education

Most students' families also own between 1 and 10 horses (93%), cows (92%), sheep and goats (69%); and 11-50 horses (6%), cows (7%), and sheep and goats (20%); and 51-100 horses (1%), cows (0%) and sheep and goats (9%). Only 55.5% of the families owned a bank

account (Note: this data should be interpreted with the Kyrgyz context in mind where livestock is a form of saving/banking).

The high number of students reporting home ownership and ownership of livestock, as well as a third indicating ownership of additional land shows that all students experience a good level of safety and security that is promotive of their overall well-being.

Most students also report that their homes have the necessities needed to live a fairly comfortable life. They report their homes have a toilet/bathroom (67%), a guest room (93%) and over half of them their own room (57%). Nearly all students' homes have the necessary appliances such as a stove and oven (95%), a washing machine (95%), a refrigerator (96%), a television (97%) and DVD players (70%). Fewer students report their homes have the luxury appliances of air conditioners (27%) and dishwashers (12%). About half of the students indicate their families own motor vehicles (45%) with 13% having two vehicles. Motor vehicles may be a necessity as well as a luxury depending on the kind and use of the vehicle.

The reports of students also indicate that there are many facilities in their homes that are supportive of learning. Most students have a place to study (84%), a desk for study (89%), books to help with study (86%) including dictionaries (83%) and books by Central Asian writers (79%). 86.6% of the students' families own between 1 and 100 books. In addition, 44% have computers for study, 36% have a computer connected to the internet and 24% educational software. Most students' families (97%) have cellphones (75% of them had 3 or more) with 90% of the cellphones connected to the internet (47% of them had 3 or more) in their household. The high rate of mobile internet connectivity indicates a possibility for student learning beyond their classrooms and schools. Furthermore, the presence of works of art in many students' homes (51%) and musical instruments (35%) and the fact parents want schools to offer classes for their children to learn how to play musical instruments (parents' interviews) indicate that parents want to promote their children's holistic development.

How students use their time outside of school

Physical activities and eating habits

We asked students on the most recent day you attended school did you do any of the following before going to school? And after school? Students reportedly engage in several activities outside of school such as eating and talking with family members, talking and playing sports with their friends, doing school related tasks and watching videos. Because they have more time available after school than before school, more students engage in each of the activities after school than before school. Before coming to school 81.9% eat breakfast and 89.8% eat lunch after school. Spending time talking to their parents appears to be important to both students and parents because it is the only activity engaged in as frequently before school (88.5%) and after school (88.5%). The students also spend a lot of time in the company of their friends. They spend time *before* and *after* school simply talking to their friends (62.3% & 80.1%) as well as engaging in outdoor sport activities with them (52.9% & 58.6%). They spend a significant amount of time studying (74.6% & 88.5%). They do their homework, read books and magazines (47.4% & 65.7%) and attend additional classes or participate in club activities (31.2% & 52.4%). The students also make time for

entertainment, watching videos both offline and online (45.5% & 72.8%), playing video games (20.9% & 27%) and chatting online (57.1 & 66%).

Students' reports of how they spend their time both before and after school show that each day they spend time talking with their family and friends face-to-face or over the internet. They spend time eating, studying and watching videos indoors but also make time for outdoor sports activities.

Caring for family members and working for pay

A high percentage of the students have the responsibility to care for family members. They report caring for family members *before* school 68.1% and *after* school 89.3%. A comparatively low percentage of students work outside of school hours. 10.2% of the students report working for pay *before* and 13.4% *after* school.

In Kyrgyz society the joint family system is quite common and as the data indicates at least one-fourth of students have their grandparents living with them, many of whom require some form of care. Moreover, with a high percentage of both parents working older siblings care for their younger siblings especially when they return home from school. For example, older siblings walk younger siblings home from school, give them lunch and ensure they are safe whether at home or at play with friends in the neighborhood.

Summary

Most students seem to be living comfortable and fulfilling lives in all dimensions of well-being and express an overall satisfaction with life. Students have a keen sense of belonging at school, because of the very positive relationships they have with their teachers and peers. They have parents who provide for them, make time for them and take an interest in their home and school lives. The only area where students report moderate levels of anxiety and stress is related to their schoolwork. The students report moderate level of anxiety in worrying about being unable to solve a problem, tests being too difficult, and getting poor grades. The moderate levels of anxiety about their academic performance are related to their high educational and career expectations and can be used as motivation to achieve their expectations.

Key Findings and Policy and Practice Recommendations

Key findings

- The students report moderate levels of schoolwork related anxiety.

- The students have a high motivation to achieve in order to get into the best universities and secure the best job.

- The students have high educational expectations with 78% expecting to obtain a university degree.

- Most students have very positive perceptions about their school lives; they feel a sense of belonging at school and have positive relationships with both their teachers and peers.

- Parents have a strong presence, take an interest and actively engage in their children's home and school lives.

- 25% students live in extended families. 83.5% of mothers and 77% of fathers have a high school certificate or higher education diploma. Over 50% of mothers and fathers are in full-time employment.

- 92.4% of families own their homes which are equipped with all the necessary comforts.

- Students' homes are supportive of learning with 84% having a place to study, 86% having books to help with studies, 36% having computers connected to the internet and 90% having cell phones with internet access.

- The students use their time out-of-school in a variety of activities including spending time talking with family and friends, out-door sport activities, doing schoolwork both offline and online and watching videos and playing video games.

- A high percentage of students care for family members, while about 10% are in gainful employment.

- 68.3% of the students are very satisfied and 17.8% satisfied with their current lives.

Policy and practice recommendations

Convert student anxiety and stress to achievement motivation

Anxiety is not necessarily a negative psychological state. If it can be reduced to a manageable level and at the same time, converted into a driver or motivator for the students to study harder and smarter, this seemingly negative psychological state could be positively directed. The teachers could use the rationale that working hard and smart would lead to higher grades facilitating them to realize their educational and career expectations. This will require teachers to develop students' skills, such as problem solving, critical thinking, effective communication, and collaboration and using them for authentic learning. 21st century skills may not be subject specific; however, they are fundamentally critical for the effectiveness of student learning and ability to solve real-world and workplace problems.

Use students' positive perceptions and satisfaction with life to challenge them intellectually and ensure their future well-being

Most students have very positive perceptions about their school lives and their relationships with their teachers and peers. Also, more than two-thirds of the students were satisfied with their current lives. This very positive attitude toward life and school in general should be used to challenge students to develop their 21st century competencies and ensure their future well-being.

Develop students' collaborative skills

Good peer relationships and student-teacher relationship are an important component in the formula of student academic success. Teachers could take advantage of the students' positive attitude toward their peers with collaborative learning. Collaborative learning would not only help students develop their cooperation skills, which are important skills in today's workplace and society, but also benefit their learning. When working in small, purposeful

groups, the more competent students help the less competent students with their learning. In so doing the more competent students refine their understanding of the subject. Thus, collaborative learning is an effective instructional strategy that benefits both advanced and struggling students.

Educate parents in the ways they can support their secondary school children

Hill and Tyson (2009) suggest that parents of secondary school students facilitate academic socialization into the longer term and in life-long education goals. They found that communicating higher academic expectations, fostering academic aspirations, discussing learning strategies and planning for children's academic future increase student achievement significantly. However, helping adolescents with their homework or sourcing materials for them have been shown to have a negative effect on student academic achievement (Ibid; PISA, 2015). Schools must educate parents on how best to facilitate their adolescents' academic socialization, helping them to see that what helped their primary school children succeed (e.g., helping them with their homework) may be counterproductive with their now more mature and independent adolescents.

Section VII: THE SCHOOL LEADERSHIP

Introduction

School leadership is important for improving student achievement (Pont, Nusche and Moorman, 2008; Robinson, Hohepa and Lloyd, 2009) and in improving underperforming or failing schools (Branch, Hanushek and Rivkin, 2013). There is no empirical evidence that shows the relationship between school leadership and student achievement (Hallinger & Heck, 1996 cited in OECD 2014, p. 56). Many studies show school leaders as contributing to student achievement through clearly identifying the school's mission and goals, creating a positive climate in the school, ensuring effective organization of curriculum and instruction to enhance opportunities for student learning (Ibid, p. 56), fostering professional development and shared ownership (Barth, 1989). Research also shows that schools with better management have better test scores (World Bank, 2018). Thus, it is important to understand how schools are managed and the roles school leaders play especially with respect to the schools' mission and goals and curriculum and instruction.

This section provides a profile of the school directors and the work they do especially with respect to identifying and ensuring the realization of the school goals and in providing instructional leadership.

Who are the school leaders?

Age and gender

Of the school directors in the schools, seven are between the ages of 40-49, ten are between the ages of 50-59 and three are between the ages of 60-69. The average age of the school director is 53 years, with the youngest being 40 years and the oldest being 65 years. Given the average age of teachers in the school and given that school leaders are identified from among them it is not surprising that the average age of the school director is 53 years of age with the youngest being 40 years old.

The gender distribution of the school directors is quite different from that of the teachers in the schools. Although 95.5% of the teachers in the schools are female, only 60% of the school directors are female. The reason for this dichotomy needs further study. Is it because men are perceived to be better leaders and therefore more frequently appointed to the leadership positions in schools?

Formal education

Given that most school directors come through the ranks of teachers and given that 97.3% of teachers have a higher education diploma (equivalent to a bachelor's degree) it is no surprise that 90% of the school directors have higher education diplomas. What is very surprising is that one school director has just a secondary school certificate.

In addition, to asking school directors about their formal educational qualifications, they were asked if they had participated in any school management or instructional leadership training programmes prior to their appointment as school directors. In Kyrgyzstan there is no formal

educational qualification required for appointment to the position of school director. However, both government institutes for professional development and international development agencies offer workshops for school directors. 60% of school directors report participating in workshops in school management prior to assuming the position of school director.

Work experience

It is a fact that in any profession, formal education regardless of the level or type cannot prepare a person for many of the situations that might be encountered on the job, it is only in encountering and dealing with these experiences that a person learns appropriate behaviours and responsible actions. Thus, the work experience they have prior to and in their current role is important to how they work as school directors.

The school directors have an average of 12 years of experience in their role. The most work experience is twenty-eight years and the least just four months. Prior to working as school directors 60% had worked in the role of deputy director, 5% as head of education management in the oblast, 5% as methodological head in the district administration and 80% as teachers. This indicates that the school directors' experiences are largely school-based with them coming through the ranks of teachers and deputy directors.

Continuing professional development for school directors

All members of professions are required to continuously update their knowledge and skills and apply them. The school directors were asked to indicate if they had participated in any professional development activities over the past three years and to indicate the nature of the activities. Over half of the school directors (55%) report they had not participated in any professional development activities over the past three years. The 45% that did participate, attended workshops aimed at 'improving the quality of teaching and learning in the classroom (lesson planning, active learning methodologies and assessment)', 'developing a school improvement programme', 'financing schools' and 'school management to implement the new state standards'. In describing the professional development activities participated in over the last three years most of the school directors used the adjectives 'short' or 'too theoretical'. A school director recalled a professional development workshop where she spent two weeks 'hearing theories' but with 'no opportunity to see how the theory works in practice' (School D).

All the school directors stated that there should be continuing professional development opportunities for school leaders and that they themselves would like to receive more professional development in school improvement, general and financial management including budgeting. In addition to planning and managing schools many want professional development in the areas of curriculum, teaching and learning. Areas identified were use of ICT for teaching and learning, developing subject-based teaching and learning materials, increasing student interest and motivation to learn, and attracting and retaining young teachers at the school. Some of them wanted opportunities to meet and share experiences with directors of other schools, while others wanted to visit effective schools to see how they worked and learn from the practice of other directors. A school director referring to the last workshop she participated in said, 'We don't learn from these workshops. What we need is

to visit effective schools and see all the different dimensions of work in that school' (School A).

The work of the school director

The work of school directors is demanding and time limited, requiring them to prioritize among competing responsibilities. To find out how school directors prioritize their work, they were asked to report on how they distribute their time at school. On average the directors report dividing their time between administrative tasks and meetings, curriculum and teaching related tasks, teaching in the classroom, interactions with students, building relationships with parents and the larger community. Rough estimates indicate school directors spend about 40% of their time on administrative tasks such as managing human and material resources, providing information to the government and representing the school at official meetings. They spend about 25% of their time meeting to discuss school goals with teachers, curriculum revision, observation for appraisal and feedback and facilitating professional development by giving demonstration lessons. About 17% of their time is spent counselling and disciplining students, another 10% talking with parents and 8% building relationships with the larger community. Those who teach, spend 15% of their time in planning lessons, teaching and assessment, often in addition to the time spent on the above activities.

The data shows that school directors spend about two-thirds of their time on administration and teaching related activities. This is important because fulfilling administrative responsibilities ensures smooth operation of the school and focusing on teaching improvement will probably have a positive impact on student achievement.

For the school directors who are also teachers, while their responsibilities are greater, they have the advantage of keeping close to the main job of the school – teaching. Teaching provides them the opportunity to work with other teachers, maintain a close relationship with students and parents and identify areas for school improvement.

In most schools in Kyrgyzstan, the school director shares administrative responsibilities with three deputy directors, responsible for academics, co-curricular activities and discipline respectively. The deputy director academics makes the teaching schedule for the year and any changes required during the year. Every day they ensure teachers are in classrooms, appointing substitutes for absent teachers. They are also responsible for maintaining all academic related documents including teacher and student attendance records. They also appraise and provide feedback to teachers and prepare for teacher meetings. The deputy director co-curricular activities prepares the co-curricular schedule for the year and facilitates the organization and conduct of regular and special school events and participation of students in out-of-school events. The deputy director for discipline ensures a safe and secure environment for all students. They also look after the needs of the disadvantaged students in the school.

In addition, there are methodological heads (teachers with additional responsibilities) whose main function is to ensure quality teaching and learning. They guide teachers in planning and developing tools for assessment of learning and observe lessons and provide feedback for improvement. They share best practices to improve the teaching and learning process. They also monitor and evaluate results of the teaching and learning process to determine areas for

professional development. They are also responsible for the mentorship process, identifying mentors and ensuring they fulfill their responsibilities.

School directors also share responsibilities with the parents in the schools. Parent Committees serve as a bridge between the school and the larger parent community. The Parent Committees play an important role in raising money for school improvement and managing its disbursement. They also support the organization of school events and participate in the open lessons of teachers. In schools where parents form a Board of Trustees (BoT), it plays an important role in the decision-making with respect to school policies and in raising and managing funds for school improvement.

Planning school goals and programmes

Today, more than ever before the most important goal of schooling is to improve student achievement both in the core subjects and the 21st century skills so that graduates can go on to foster the social and economic development of their countries and make them more competitive in the global economic market. This has resulted in the need for school leaders to focus more on determining and realizing school goals and by providing instructional leadership through developing and implementing programmes for effective teaching and learning. This part looks at the work school leaders do in setting goals and identifying the activities that will ensure they are achieved.

In interviews the school directors were asked if they had a school improvement plan, how it was developed, what were the goals, what plans they had to realize the goals and the challenges faced in realizing them. All the school directors report that they have a school improvement plan (SIP) with most plans spanning 1-5 years. All the school directors state that in developing the plan they consider the findings from the internal evaluation including student performance results. The plans are developed collaboratively by a school team. Opinions and suggestions are widely sought before the team develops the plan. Teachers are occasionally included in the development of the plan with one school also reporting the inclusion of student voices.

One of the main goals in all the SIPs was to improve the material and technological resources of the school such as adding a school building, modernizing classrooms, obtaining computers, smartboards and the internet. Most SIPs also include the goal to increase students' knowledge and skills. Some SIPs include the promotion of the professional development of teachers. A few SIPs also had goals to improve the school's relationship with the parents and the larger community. Most school directors sought to meet the required material and technological resources by participating in various international development projects or attracting sponsors. Through organizing master classes or workshops and implementing different teaching methodologies and preparing students for test and Olympiads they sought to improve teaching and student learning.

When asked about the challenges in realizing the goals, most of the school directors identified two challenges: lack of finances and the lack of qualified and motivated teaching staff.

Instructional leadership and promoting teacher development

The school directors in the schools play an active role in the management of teaching and learning through clearly identifying and working to achieve the schools' education goals,

providing support in curriculum development and observing teachers lessons and providing feedback and support for improvement. In developing the educational goals for the school, school directors (*always & often*) provide staff with opportunities to participate in decision making (95%), use students' performance results to develop the school goals (100%), discuss the goals with teachers at teacher meetings (100%), consider the school's goals in curriculum decisions (100%) ensure teachers work according to the school's goals (100%) and professional development is in keeping with the school goals (100%).

The school directors (*always & often*) provide curricular and instructional support by ensuring the school's educational goals are considered in developing the curriculum (100%). The school directors work together with the teachers to plan curricular (89%) and co-curricular activities (79%). Moreover, in about half of the schools, the school directors report teachers work together to develop teaching and learning materials to support the subject curricula.

With respect to supporting the teaching and learning process, school directors regularly observe teachers teaching in the classroom and give feedback (75% always, 25% often). They draw teachers' attention to the importance of developing students thinking and social competencies (75% always, 25% often), give suggestions for improving teaching (75% always, 25% often), praise teachers whose students actively participate in learning (70% always, 30% often), and compliment teachers for special efforts (41% always, 34% often). More generally, when teachers have problems, the school director takes the initiative to discuss the matter with them (50% always, 45% often). The school directors also promote teaching practices based on recent educational research (45% always, 45% often) and keep teachers abreast of professional development opportunities (60% always, 40% often). Although this study shows that there is high absenteeism in schools with high percentages of class cancellations, school directors report that they do teach lessons of teachers who are unexpectedly absent. There are likely two reasons for this response. Firstly, many school directors also teach and do not have time to take on more teaching responsibilities. Secondly, the deputy director (academics) is responsible to ensure a substitute for the absent teacher.

The data suggests the school directors provide more supervision than support for the teachers. The most frequent tasks of the school directors are ensuring the teachers teach according to the school goals (90% *always*) and direct teachers to improve their teaching (75% *always*). Complimenting teachers for special effort was the least practiced (41% *always*). Also, taking the initiative to discuss problems with teachers when they arise was not a common practice (only 50% *always* did) nor did school directors 'always' inform teachers of the PD opportunities (60%). The uneven levels of supervision and support may be detrimental to the morale of the teachers in the long run and could degrade the teachers' overall teaching performance.

Assuring quality and school climate

Most schools have a fairly complete mechanism to ensure the quality of teaching and learning by implementing a variety of measures, such as internal evaluation (80%), written school curricular profile and goals (74%), records of student results and graduation rates (90%) and teacher mentoring (95%). The school directors ensure quality by taking some mandatory actions and taking some actions on their own initiative. Mandatory actions include external evaluation (70%), written specification on student performance standards (74%), recording

of students and teacher attendance (79%). Self-initiated actions include seeking written feedback from students (53%) and regular consultation with experts (45%) for school improvement. The school directors report that based on the last internal evaluation, the school implemented measures in all the areas listed such as educational staff workload/qualifications (70%), implementation of curricula and co-curricular activities (both 75%), quality of teaching and learning (84%), parental engagement in school (80%), teacher professional development (85%), student achievement (80%) and equity (85%).

Summary

The job responsibilities of school leaders are varied and many. They are expected to be visionary leaders, skilled administrators, experts in teaching, learning and assessment, effective human resource managers, good public relations officers, and adept fund raisers. Despite these many roles, there is no formal educational requirements for appointment to the position of school directors and few opportunities for continuing professional development. The main responsibility of school leaders is to ensure that the main task of the school – teaching is directed to student learning and achievement. School directors do this by ensuring the teaching and learning process is directed to achieving the school mission and goals.

Key Findings and Policy and Practice Recommendations

Key findings

- The average age of the school directors is 53, with the youngest 40 and oldest 65.

- Only 60% of school directors are female even though 95.5% of the teachers are female. This indicates a gender imbalance and preference for male leadership.

- 90% of the school leaders have a higher education diploma (equivalent to a bachelor's degree) the same educational qualification as required of teachers.

- The school directors have an average of 12 years' experience in this role. 60% have experience working as deputy directors and 80% as teachers.

- Only 60% of school directors attended short workshops on school management prior to their appointment as school director and only 45% have participated in professional development activities over the last 3 years.

- All the school directors want opportunities to continue their professional development.

- School directors spend about two-thirds of their time on administration and teaching related activities.

- School directors play a key role in developing the schools' educational goals, in the teaching and learning process and in assuring quality.

Policy and practice recommendations

Develop professional standards for school directors

Develop professional standards for school directors specifying what they should know, be able to do and the character qualities they should have. The professional development

standards should serve as a framework for identification of persons for the position of school director. It should also be used for determining professional development activities for school directors prior to and post appointment.

Develop formal programmes to prepare school leaders to enter the profession

School leaders are required to play many and varied roles for which they currently receive little professional development. They require training in many areas including school leadership and management, instructional leadership, monitoring and evaluation, and school financing and budgeting. Formal training in these areas will increase school leaders' knowledge and skills facilitating school improvement and consequently student academic achievement.

Provide opportunities for continuing professional development of school leaders

All professionals need to remain current in their professions through participating in continuing professional development. In this study only 60% of school directors received professional development in the form of 'short' workshops prior to becoming school directors and only 45% have participated in professional development activities over the last three years. It is imperative that school leaders be provided high quality professional development as what they do in schools affect student achievement. A key focus of the continuing professional development must be on assisting school directors in making more effective use of student assessment and performance data to determine the school's educational goals and in learning how to monitor and evaluate progress towards achievement of the goals. As a key goal of schools is to improve teaching and learning, it is important that school directors be prepared as instructional leaders, providing leadership with respect to the teaching, learning and assessment processes in schools and ensuring teacher professional development is focused on improving student learning and achievement of the school's educational goals.

Encourage and support the sharing of responsibilities

The school directors share their responsibilities with several key individuals. This is a strength of the school system in Kyrgyzstan and must be encouraged. It is important that those who share these responsibilities are well prepared and supported to fulfill them.

Section VIII: DEVELOPING AND SUPPORTING TEACHERS

Introduction

This section focuses on the teachers' experiences of professional development. Professional development refers to the activities that facilitate the development of teacher knowledge, skills and dispositions aimed at improving teaching and student learning. It begins by sharing the literature on the importance of professional development. It examines the opportunities teachers are provided to participate in professional development including onboarding and mentoring of new teachers. It also examines the school and personal variables which might affect participation. Teachers' needs for and barriers to participation in professional development are also discussed.

It is a well-known fact that teachers are the key to ensuring student achievement. Although most education systems around the world require teachers to have both academic and professional training when they enter the teaching profession, they must also ensure teachers have opportunities to further develop their knowledge and skills to stay current in their profession. For the longest time teaching has focused on the development of students' content knowledge in different subjects; today it must also include the development of the cross curricular competencies of critical thinking, collaboration, cooperation, communication, cultural intelligence, citizenship, character qualities and use of digital technologies to prepare students for success in further study, work, and citizenship in the 21st century.

Professional development is defined as the development of teachers' knowledge, skills and character qualities and the ability to transform them into effective practices to promote student learning and development. Professional development can be both formal (courses and workshops) and informal (discussing teaching and learning issues with colleagues) and be provided in-school (collaborative planning) or external-to-the-school (programmes of study leading to a qualification).

In Kyrgyzstan all teachers are required to have at least a bachelor's degree in a subject to teach. All teachers are also required to have seventy-two hours of continuing professional development every five years. Continuing teacher professional development is largely provided by the Republican Institute for Professional Development (RIPD) and its network of teacher training institutes and methodological centers in each oblast. However, due to a lack of teacher educators and finances formal qualification programmes do not offer a practicum and many teachers do not even receive the mandatory seventy-two hours of training every five years. Since independence from the Soviet Union in 1991, many international development agencies have provided continuing teacher professional development in the form of short workshops focusing on developing particular skills (e.g., reading, critical thinking) and active learning instructional methodologies. Most of these efforts have not included support and coaching of teachers to facilitate effective classroom implementation leaving teachers unable to transform their new knowledge into practices that support student learning.

The findings reported in this section come from questionnaires filled in by the teachers and school directors and interviews with the school directors, deputy directors' academics and methodological heads. Teachers were asked about the professional development activities

undertaken over the last two years and to estimate its impact. They were also asked about the support they receive from their schools for undertaking professional development, the extent to which they want more professional development than they had engaged in, the barriers they feel have prevented them from doing so, and the areas of their work most needed for further development. The school directors were also asked about the nature of the support the school provided for teacher professional development.

Supporting Beginner Teachers

Initial teacher education, no matter how good cannot prepare teachers for all the challenges they face when they begin teaching in schools. Effective induction programmes can help new teachers face the 'praxis-shock' by providing them with personal and professional support. Ingersoll and Strong (2011) reviewed empirical studies on the effects of induction programmes on new teachers and found that support and assistance for beginning teachers has a positive influence on many outcomes, such as teachers' commitment and retention and students' achievement. Most importantly it has been found that students taught by teachers who receive comprehensive induction support demonstrate learning gains that are larger than those experienced by students taught by teachers who do not receive such support (Glazerman et al., 2010).

Availability of and participation in mentoring programmes

School directors were not asked directly about programmes offered to support beginner teachers during the interviews but 75% of them report they have a mentoring programme offered to beginner teachers, less experienced teachers and teachers who do not have the skills in a specific area such as ICT. They also report about 95% of teachers engage in mentoring on a regular basis in their schools. However, only 54% of the teachers' state that they participate in mentoring as part of the school programme. In describing their role, the methodological heads pointed out that they are responsible for the schools' mentoring programme and they identify mentors for new and less experienced teachers.

Importance of Participation in Professional Development

The reason teachers must participate in continuous professional development is stated clearly by the European Commission in their publication, 'Supporting teacher competence development: for better learning outcomes' which reads:

> Teaching competences are thus complex combinations of knowledge, skills, understanding, values and attitudes, leading to effective action in situation. [...] The range and complexity of competences required for teaching in actual societies is so great that any one individual is unlikely to have them all, nor to have developed them all to the same high degree. [...] Teachers' continuous professional development is, thus, highly relevant both for improving educational performance and effectiveness and for enhancing teachers' commitment (EU 2013, p. 8-9).

There is substantial empirical evidence showing that teachers' professional development impacts students' scores. These studies conclude that professional development of a considerable number of hours over six to twelve months show significant and positive effects on student achievement (Yoon et al. 2007; Hill, Beisiegel and Jacob, 2013).

In this study, some school directors state that a school educational goal is to promote the professional development of teachers, but only two school directors indicate that they have a plan for the professional development of their teachers. Moreover, only 10% of schools report they have a budget to support teacher professional development.

Participation in Professional Development Activities

Participation rates

Participating in professional development is a common activity across schools in Kyrgyzstan. All the teachers report participating in professional development activities in the last two years. All these teachers participated in a variety of professional development activities at school. In addition, the school directors report that 39.3% of teachers attended professional development activities offered externally over the last academic year and 56.2% of the teachers report participating in them over the last two years.

Professional development activities engaged in

The teachers' report, the most common professional development activities they participate in, in descending order are: observing each other's classes (95%), reading professional literature (90%), engaging in informal dialogue with colleagues (89%) and attending workshops/seminars organized by the school on specific subjects and issues (85%). Two-thirds of the teachers also report observing teachers at other schools (68%) and attending conferences (62%). About half of the teachers participate in mentoring and coaching as part of the school programme (54%) and in teacher networks (48%). Much fewer teachers participate in individual and collaborative research (38%), and in qualification programmes (15%).

The school directors' reports confirm the teachers' reports that the most common professional development activities the teachers engage in are reading professional literature (100%), peer observation of classes and giving constructive feedback (95%) and attending workshops/seminars in the subjects they teach (84%). There is also consistency between reports by the school directors and teachers with respect to teachers participating in education conferences (65%) and in individual and collaborative research (42%). However, there is a huge difference in opinion about participation in mentoring and peer-coaching as part of the school programme by the school director (95%) and teachers (54%) as well as in the observation of teachers in other schools (school directors 80%, teachers 68%). The school directors also seem to underestimate the time teachers spend in informal dialogue about teaching and learning with colleagues as they estimate 68% while the teachers indicate a high 89% and overestimate the number of teachers participating in qualification programmes (school directors 40%, teachers 15%) and teacher networks (68% school directors, 48% teachers). In their interviews the school directors also mentioned holding master classes and organizing demonstration lessons to facilitate teacher professional development. However, school directors' reports indicate that these professional development activities occur more frequently than the teachers report attending them.

From the above it is evident that currently, the main avenues for the teachers to update their professional knowledge and skills are reading professional literature, peer observation and feedback, engaging in informal dialogue with colleagues about teaching and learning and

attending workshops/seminars in the subjects they teach. From the interviews of the school directors, it is evident that many of these workshops/seminars are conducted in-house by other teachers as only 60% of schools report inviting specialists to conduct professional development activities.

Only 56.2% of the teachers report that they participated in professional development programmes external-to-the-school over the last two years, for one to thirty days with an average of eight days. And according to the school directors' report over the last academic year only 39.3% of their teachers attended professional development programmes externally. Science teachers were the highest attendance group (28.4%), followed by mathematics teachers (26.9%), informatics teachers (26.1%), and English teachers (24.6%).

While informal and in-house professional development is important and contribute to teachers' professional development, it is also important for teachers to be given such opportunities external-to-the-school to develop new knowledge and skills. Teachers on return to their schools should be provided opportunities to share their new knowledge and skills with their colleagues so that the innovations are implemented, and teachers stay current in their profession.

Teachers perception of the effectiveness of their professional development

The teachers were asked to report on the impact of the professional development activities they engaged in over the last two years. The teachers report a '*large and moderate*' impact on their teaching from the in-house and informal professional development activities. The highest impact was reported from peer observation of lessons (91%), reading professional literature (81%), and engaging in informal dialogue with colleagues (83%). Attending workshops/seminars on their subject both in-house and out-of-school are also impactful (76%) as is peer observation in other schools (61%). In-house mentoring/coaching activities (51%) have a lesser impact on their practice and the least impact is experienced from out-of-school activities such as education conferences (56%), teacher networks (42%), individual and collaborative research (35%), and qualifications programmes (12%). It appears that teachers learn more from professional development that is practical than theoretical as without support they maybe unable to convert theory into effective classroom practice.

Support for teachers' professional development

The school directors were asked how the school supports or encourages the professional development of teachers. All the school directors report they support teachers by organizing professional development activities in-house and all the teachers report they participate in professional development activities at the school. The school directors also report they encourage teachers to participate in professional development activities offered externally by regularly gathering and sharing information on such opportunities at the district level and beyond. This was also corroborated by the teachers.

90% of the school directors report providing time for teachers to participate in professional development activities external-to-the-school during the school year. External professional development activities usually require payment of a fee but only 10% of school directors report that they have a budget for it. It is therefore, not surprising that an overwhelming 92% of teachers want more professional development than they received and they felt there was inadequate support for it.

Scheduled time

All the schools provide time for in-house teacher professional development. Time is scheduled for teachers to observe each other's lessons and provide feedback especially for those assigned mentoring responsibilities. Time is also provided for teachers to participate in master classes, open lessons and workshops/seminars offered by colleagues or invited experts.

90% of the school directors also report providing teachers time off during the academic year to attend professional development activities external-to-the-school. The school directors point out that most of the time teachers are released from school to attend professional development workshops offered by international development agencies as part of their projects.

Financial support

Only a few school directors in their interviews state they provide financial support to teachers to participate in professional development activities offered externally. This was corroborated by the teachers as only 15% of them report receiving monetary support, 10% to attend professional development activities and 5% a salary supplement. It appears that monetary support in general and salary supplements is not a much-used form of support for teacher professional development.

Despite the lack of financial support from the school, over a quarter (27%) of teachers who did attend professional development events external-to-the-school often paid for some portion, if not all of it themselves. Teachers report paying for travel (19.8%), teaching materials (12.6%), accommodation (9.9 %) and tuition (9.9%). 5.4% paid for all four of the items listed above.

Non-monetary support

The school directors also report providing teachers non-monetary support in the form of access to newspapers and magazines. This, however, is not seen by teachers as support for professional development as only 10% of teachers report receiving non-monetary support while 90% report reading professional literature which is usually the weekly newspaper '*Kutbilim*'.

This lack of support for professional development external-to-the-school may explain the teachers' inclination toward observing their colleagues' lessons or discussing informally with them ways to improve teaching. Seeking and collaborating with colleagues within one's own school is necessary for teachers to improve their teaching skills. However, updating themselves through external sources is of vital importance to keep current with the best educational practices in the rest of world.

Teachers need for Professional Development

The professional development support that teachers receive does not always meet their needs. Teachers were asked to rate their professional development needs in eleven specific areas. Teachers report '*high and moderate*' needs for professional development in the following areas: ICT (66%), knowledge and understanding in one's subject (52%), teaching methodology (51%), individualized learning (48%), experiential learning (47%), teaching

students how to learn (46%), counseling and career guidance (45%) and cross curricular skills (critical thinking, collaboration) (42%). Low or no need at all for professional development were reported in the areas of assessment of students work, knowledge of curriculum and maintaining classroom discipline. The fact that teachers indicate they do not need professional development in assessment of students work contradicts their earlier statements in which they indicate they feel less well prepared to conduct formative assessment and use a variety of assessment strategies.

In terms of the need for professional development, ICT skills are a top priority for the teachers (66%). 75% of school directors report over the last year they organized workshops to develop teachers' ICT skills. It appears that the workshops provided failed to meet the teachers' needs. This might be due to the level of skills teachers currently have or because of the evolving nature of these technologies. From data presented elsewhere in this report it is clear teachers are challenged in integrating ICT into teaching and learning. Given the importance of developing these skills in students it is imperative that future offerings of teacher professional development focus on developing their ICT skills in general and integrating them into teaching and learning of their subjects.

The second highest was enhancing subject knowledge (52%). Though this data point is from in-service teachers indicating their current need for keeping current on the knowledge of their own subject area, it may also potentially imply that there is a need to ensure a solid preparation in subject knowledge during initial teacher education. Teachers felt a high need for learning new pedagogies, teaching students how to learn, and teaching cross curricula skills, all of which are needed to equip students with 21st century competencies.

Barriers to Professional Development

In this study, 92% of teachers reported wanting to participate more professional development. The main barriers to more professional development are the cost of participation, no relevant professional development offered, lack of employer support and lack of incentives.

Participation too costly

All schools want their teachers to improve their knowledge and skills through engaging in teacher professional development. Some schools even have teacher professional development as a goal in their school improvement plans, but only 10% have a budget to support the goal. Thus, there is little to no monetary support for teachers to undertake professional development external-to-the-school. In this study, 92% of teachers report wanting to participate in more professional development and 27% report paying for some or all aspects of it themselves. With teachers' salaries low, teachers find participating in professional development far too costly. The cost is felt more acutely as the professional development is unlikely to result in career advancement or salary enhancement.

No relevant professional development programmes

There is a lack of a range of suitable professional development offerings that teachers can choose from, especially for teachers from schools located in secondary towns and villages. In addition, as school directors report, they do not have a budget to support teachers' participation in relevant professional development activities. Therefore, when professional

development programmes are offered free of charge, teachers are sent even though the activities may not be relevant to their needs.

Lack of employer support

Teachers report a lack of employer support for their professional development. 10% of teachers report they were not allowed to attend professional development activities external-to-the-school. This is a concerning issue as these professional development activities give teachers the opportunity to learn about latest developments in the field and see how these can improve teaching and learning. Moreover, meeting teachers from other schools and knowing they will also be implementing these practices may motivate teachers to implement their learning in their own classrooms.

Lack of incentives

Teachers report a lack of incentives for participation in professional development. Only 5% of teachers report they obtained a salary supplement. With schools not having the autonomy to make decisions about teachers' salaries or provide opportunities for career advancement teachers participation in professional development programmes becomes unattractive.

Summary

Teachers need to constantly update themselves with the latest theories and instructional practice to improve students' learning and help them reach their full potential. Currently, the main avenues for the teachers to update their professional knowledge and skills are in-house and informal activities such as reading professional literature, engaging in dialogue with their colleagues, peer observation of teaching and participating in workshops/seminars. Teachers also attend educational conferences and are members of teacher networks. Teachers perceive the in-house and informal professional development activities have a greater impact on their teaching practice. Currently, the teachers indicate need for development of their ICT skills, subject knowledge and pedagogy and cross curricular skills. However, the support they receive to participate in professional development externally is scarce as 90% of the schools do not have a separate budget for it. This lack of funding for professional development is an obstacle to providing constant and steady professional development opportunities for teachers.

Key Findings and Policy and Practice Recommendations

Key findings

- All the teachers participated in professional development activities offered at the school over the last academic year. But only 39.3% participated in professional development activities external-to-the-school during the same period.

- 75% of schools have mentoring programmes. Mentoring is provided to new teachers, less experienced teachers and teachers who need to learn a specific skill.

- Some schools have teacher professional development as a goal, however, only 10% have a budget for it.

- Teachers engage in a variety of professional development activities most of which are in-school (peer observation) and informal (engaging in dialogue with colleagues). Most teachers report these activities have a high to moderate impact on their professional development.

- Teachers report inadequate support for their professional development with an overwhelming majority (92%) wanting more professional development.

- Teachers identified ICT as their highest need for professional development. Subject knowledge, new pedagogies, experiential learning, cross curricular skills and counselling and career guidance were high to moderate needs for half of the teachers.

- The main barriers to teacher professional development are participation is the cost, lack of relevant professional development programmes on offer, lack of employer support and incentives.

Policy and practice recommendations

Develop a comprehensive teacher professional development programme with a budget in keeping with the schools' educational goals and needs of teachers

Teacher professional development should be a goal in all schools' education improvement plans and a comprehensive programme and implementation plan should be developed to meet the goal. This programme should include the following:

An induction and mentoring programme for new teachers

With pre-service teacher education programmes largely theoretical, it is important that schools develop and offer a strong induction and mentoring programme to new teachers. This programme should continue for the first five years as research shows such programmes have a positive impact on student achievement.

An in-house professional development programme that is focused, practical and

continues over time

The in-house teacher professional development programme should be in keeping with the school's education goals and data driven. Both teachers and students' needs with respect to the goals should be clearly identified and the programme designed to meet these needs with a focus on practice in teacher's own classrooms. The programme should continue as research shows that programmes delivered over six to twelve months positively affect student achievement.

Strategically coordinate the participation of teachers in external professional

development programmes

With limited funds and with teachers indicating less impact on their teaching from attendance in conferences or research, these could be strategically coordinated by selecting teachers most likely to benefit from them. These teachers should be required to share their learnings with colleagues.

Bring in outside experts to address teachers' development needs

Another cost-effective strategy is to bring in outside experts to address teachers' professional development needs. This will allow for greater number of teachers to participated and for support and coaching as teachers apply the new learning in their classrooms.

Develop individual professional development plans for teachers

Teachers indicate they need further professional development in their subject knowledge and in subject pedagogy. They may best be helped to meet these needs by developing an individual professional development plan, outlining outcomes and strategies to meet them. Support and follow-up is important to ensuring realization of the identified outcomes.

Prioritize teacher professional development in ICT, 21st century pedagogies, developing cross curricular skills and formative assessment

Most teachers have identified ICT, new pedagogies and developing cross curricular skills as high needs for professional development. Both students and parents report that these are areas of need. There is also a need for teachers to learn how to use formative assessment effectively. Schools should make these areas a priority for teacher professional development over the next year.

Remove the identified barriers to teachers' professional development

The government must put in place a policy to support the continuing professional development of teachers by ensuring this is a budget line in school budgets and allocating monies for it.

Section IX: IMPROVING TEACHING AND LEARNING USING APPRAISAL AND FEEDBACK

Introduction

Appraisal for this study is defined as the review of teacher's work by someone internal or external to the school. Feedback is defined as communication of the result of the review with the purpose of identifying good performance and areas for improvement.

Teacher appraisal and feedback can be used for many purposes. It can be used to help teachers to understand and improve their teaching practice. It can also be used to identify professional development needs of individual teachers or across a school. Good performance can be identified and shared. It can also be used to determine career progression, promotion or termination.

Research shows there is no direct correlation between teacher appraisal and student achievement (OECD, 2013). However, it has shown that when teachers receive continuous feedback on their teaching, it can be used to improve teaching and thereby student learning outcomes (Hattie, 2009; Gates Foundation, 2010). For appraisal and feedback to improve teaching and student learning it must be focused on identifying specific aspects of teaching to be improved and addressing weaknesses through targeted professional development. It must also focus on identifying and sharing effective practices across the school.

This section focuses on examining the teacher appraisal and feedback process. It identifies and examines the sources of appraisal and feedback, the methods used, and the focus of the feedback received. It then discusses the outcomes of teachers' appraisal on classroom teaching and learning and on teachers and their careers. Finally, teachers' perceptions on the appraisal and feedback systems in their schools are discussed.

The Appraisal and Feedback Process

Who provides teacher appraisal and feedback

Formal appraisal of teachers is carried out by persons both internal and external to the school. According to reports of school directors all the teachers are formally appraised by the school administrators as well as by individuals external-to-the school at least once a year. All the teachers agree that the school administrators appraise them at least once a year and 55% report yearly appraisal by individuals external-to-the-school. A fifth of the teachers (21%) report more frequent appraisals by external appraisers.

In addition to being formally appraised both the school directors and teachers report regular informal appraisals. The school directors report conducting teacher appraisals quarterly, monthly and weekly. The teachers report the same, with 41% reporting *quarterly*, 20% *monthly* and 21% *weekly* appraisals. In addition, teachers indicate regular appraisals by the methodological heads and their colleagues. 39% of teachers report being appraised by the methodological head at least *quarterly* whereas the rest report being appraised more frequently (28% *monthly* & 18% *weekly*). Teachers are most frequently appraised by their colleagues. 33% report these appraisals occur *weekly*, 18% *monthly* and 39% *quarterly*.

Most teachers (81%) report receiving feedback from their school administrators after their appraisals (both formal and informal) but only 46% report receiving feedback from the external appraiser. Following their informal appraisal, 74% of teachers report receiving feedback from the methodological heads and 66% report receiving feedback from their colleagues. The data shows teachers were most unlikely to receive feedback from external appraisers. The reason for the low levels of feedback from the external appraisers could be that teacher appraisals are unlikely to result in career progression, promotion or termination.

Methods for engaging in appraisal and feedback

There are several methods used to obtain data for appraisal and feedback. The most frequently used method is the observation of teaching which the school directors report is always used by external individuals, by the school administrators and by peers (methodological heads and colleagues). In addition to classroom observations, peers also review teachers lesson plans and assessment instruments. According to most school directors (90%) another method used is assessment of student achievement based on students' quarterly test results to see if students have improved from one result to the other.

In the interviews school administrators report that end-of-the-year appraisals are holistic. They consider reviews of peer assessment of lesson observations including open lessons. In addition to students' performance result in school tests, student performance in Olympiads and the ORT is also considered. A few schools also consider results of a survey of students and teachers, results of a teachers' competition or the popularity of a subject among students (e.g., elective courses offered in grades 10-11).

Focus of feedback

Most of the teachers (93%) report feedback is generally focused on teaching specifically related to the lesson observed. Teachers report in providing feedback the following areas are considered with '*high*' importance. The most importance is given to their knowledge and understanding of the subject (68%), knowledge and understanding of subject specific methodologies (66%), relationship with students (66%), their working relationship with colleagues (58%) and the use of innovative instructional strategies (50%). Importance is also given to students behaviour and discipline (48%), the conduct of co-curricular activities with students (45%), student feedback on teaching (45%), parents' feedback on teaching (43%), their working relationship with the school administrators (41%,), and the professional development undertaken (42%). Relatively less importance is given to the achievement of student learning outcomes (39%), students retention and pass rate (38%), and student test scores (32%).

According to the school administrators, the focus of the feedback includes organisation of the education process, students test results, Olympiad results, results in the ORT and popularity of subjects among students.

The focus of feedback given by the methodological heads whose main task is to improve teaching is based on the specific areas identified in the lesson observed.

This data shows teacher appraisal is generally based on lesson observation and feedback on the teaching process with little attention to how teaching facilitates achievement of the

learning outcomes of the lesson. More importantly feedback must also focus on how well the teacher is performing with respect to realization of the goals set for student achievement.

Outcomes of teacher appraisal and feedback

Teachers were asked to report on the extent to which the appraisal and feedback received led directly to opportunities for professional development, salary enhancement or career advancement. The teachers report the most important outcome from the appraisal is increased confidence as a teacher (*large* 43%, *moderate* 32%). The least likely outcomes are obtaining an increase in salary (*slight* 33%, *no* 46%) or receiving more opportunities for professional development (*slight* 28%, *no* 32%). Other outcomes include public recognition from the school administrators and colleagues (*large* 29%, *moderate* 22%), requests to assist with development initiatives at the school (*large* 18%, *moderate* 29%) and increased requests to take on additional responsibilities (*large* 26%, *moderate* 33%) that make the job more attractive and satisfying.

Interviews with school administrators indicate that teacher appraisal is followed by methodological assistance provided in-house to those teachers who are not performing well. The methodological heads concurred with the school administrators. They report that following the appraisal they give feedback based on the identified needs. Feedback includes giving advice, sharing experiences and teaching methods, discussing classroom management, and assisting with lesson planning. They also report that a mentorship programme might be put in place for the teacher.

A few school directors report that each quarter teachers whose performance is outstanding (attend school regularly, conduct good demonstration lessons and actively participate in school activities) are identified for the 'stimulating fund' where they receive an additional 10% salary from the government for that quarter.

In the interviews all the school directors report that a teacher performance review is conducted at the end of the year. Four school directors mentioned that they had a Teacher Assessment Committee or an Expert Council comprising of the school administrators and methodological heads who review all the data and decide on the quality of each teacher's performance over the year. Teachers whose performance is outstanding receive letters of gratitude, appreciation certificates, and diplomas by the education departments at the city, district or oblast levels. Only in a few schools do directors report that teachers' get an increase in salary for effective performance.

Teachers perception of the appraisal and feedback systems in schools

The teachers were asked about their perceptions of the appraisal and feedback received at their school. The teachers report (*strongly agree & agree*) that the appraisal received was generally a fair assessment of their work (95%) and the feedback received was helpful in their development as a teacher (97 %).

The teachers' opinions were also sought about the appraisal and feedback process more generally at their schools. Teachers believe (*strongly agree & agree*) their school directors use effective methods to determine whether they are performing well or badly (94%), discuss measures to remedy weaknesses in teaching with them (95%) and make development plans for them to improve their work (97%). While two-thirds of the teachers believe the appraisal

and feedback have an impact on their teaching, a third of the teachers indicate 'the review of teachers' work has little impact on the way they teach in the classroom' (36 %).

With respect to outcomes of the appraisal and feedback, the teachers report that those teachers whose teaching improved generally receive monetary and non-monetary support (*strongly agree* 12%, *agree* 69%). However, most teachers found the outcomes to be ineffective, disagreeing with the statement, 'teachers will be dismissed for sustained poor performance' (67%). They were also of the opinion that the appraisal was only done to fulfill administrative requirements (72% *strongly agree & agree*).

Summary

All teachers are frequently appraised and receive feedback following observation of their teaching from multiple sources both internal and external-to-the-school. All appraisers use the observation of teaching as the appraisal method except for the school directors who also use the results of student performance on quarterly tests. Teachers report in providing feedback, most importance is given to their knowledge and understanding of the subject, subject specific methodologies and their relationship with students whereas the least importance is given to achievement of student learning outcomes, student pass rates and test scores. According to the teachers, the most important outcome is an increase in their confidence as teachers and the least likely outcomes are an increase in salary or more opportunities for professional development. Teachers perceive the appraisal and feedback process to be fair and helpful but find it ineffective as teachers who show sustained poor performance are not dismissed. Moreover, from their perspective the appraisal is simply done to fulfill administrative requirements.

Key Findings and Practice and Policy Recommendations

Key findings

- Teachers are frequently appraised and receive feedback following observation of their teaching from multiple sources.

- Nine out of ten teachers report the highest importance in the feedback they receive is their subject knowledge and understanding, subject pedagogical knowledge and understanding, and their relationship with students. The least importance is given to achievement of student learning outcomes, student retention and pass rates and student test scores.

- In most schools' teacher appraisal during the year has a professional developmental focus, fewer schools use it to reward good performance. End-of-the-year appraisals are about public recognition and awards.

- The most important outcome of the teacher appraisal process is increased teacher confidence. The least likely outcomes are increase in salary or more opportunities for professional development.

- Most teachers perceive the methods used for their appraisal to be effective However, they perceive the outcomes to be ineffective as it has little to do with advancing the careers of high performers or the dismissal of sustained poor performers.

- One-third of teachers perceive the appraisal and feedback system to have no impact on their teaching.
- Nearly three-fourths of teachers report the appraisal and feedback systems in their schools are undertaken simply to fulfil administrative requirements.

Policy and practice recommendations

Promote the use of multiple sources of data for teacher appraisals

Most of the teachers report that their appraisals are based on classroom observation and that the feedback is focused on teaching specifically related to the lesson observed. It is important to use multiples sources of evidence for teacher appraisal to ensure a comprehensive and valid assessment of teacher performance (Gates Foundation, 2013)

Focus the feedback on improving teaching and student learning

Teachers report in providing feedback the most emphasis is given to their knowledge and understanding of their subject, subject specific methodologies and their relationship with students while relatively less importance is given to achievement of student learning outcomes, student pass rates and test score. Teaching must be aimed at facilitating students' attainment of the learning outcomes and feedback should be aimed at helping teachers identify the relationship between what they are doing and how it is helping all students achieve the identified outcomes.

Ensure that teacher appraisal informs professional development

Only 40% of teachers report the feedback they receive is likely to result in opportunities for professional development. It is important that the appraisal and feedback process in schools is clearly linked to identifying specific areas for improvement and targeting professional development to address them. A key to ensuring this is the preparation of the methodological heads and school directors to help teachers identify their individual needs and ensure these needs are reflected in the school's professional development plan.

Put in place a reward system for good performance

Good performance must be rewarded by both monetary and non-monetary means for teachers to continue to perform at optimum levels. There is already a range of non-monetary rewards in place in schools across Kyrgyzstan. However, only 10% of teachers indicate that good performance could possibly result in enhanced salary or career advancement. It is important that good performance be linked to salary increase and/or career advancement. It is also imperative that a career ladder be put in place for teachers as it will encourage teachers to improve their performance so that they can move up the ladder.

Dismiss teachers for sustained poor performance

Poor quality teaching affects the quality of student performance and achievement, retaining teachers who are not performing well means that students' performance will remain low affecting them for life. Moreover, retaining poor performers can have a negative effect on teacher morale, discouraging them from staying motivated and further improvement.

Section X: PARENTAL INVOLVEMENT IN SCHOOL

Introduction

Families are the first social unit in which children learn and develop. Parents provide the care, love, guidance and protection needed for the healthy physical, cognitive, social and emotional development and well-being of their children. It is not surprising, then, that parent-child interactions have consistently been shown to influence students' achievement, expectations, attitudes and psychological health (Fan & Williams, 2010; Hill & Tyson, 2009; Kaplan, 2013). The second social unit that makes an important contribution to the way children learn and develop is the school. Parents are also key players in helping their children succeed at school. Parents often read to their children, provide appropriate space and time for learning and talk to them about their day at school which research shows facilitates student achievement. Research also shows that parental involvement in the school such as volunteering to help with school activities and taking an active part in school governance are also positively related to student achievement and the more intensely the parents are involved, the greater are the positive effects (Vijaya, S. Vijaya, R & Rajeshkumar, 2016).

This section explores how some forms of parental involvement, such as their interest and involvement in their child's life, the activities they engage in together, and parents' participation in school-related activities, are associated with how well students do in school. It concludes with a discussion of factors that parents regard as obstacles to their participation in their child's school activities.

Parental Involvement at Home and at School

In this study most of the students indicate that both their father (54.2% full-time & 11.3% part-time) and mother work (52% full-time & 9.2% part-time). For parents who work, finding a balance between their professional and private lives is difficult, often leaving them with only a few hours each day to interact with their children. Finding time to get involved in their children's education is difficult, especially to participate in their children's activities at school because work and school times generally overlap. Despite all these challenges, the data paints a very positive picture of parental involvement in their children's lives at home and at school.

We asked students how often their parents engaged in various activities at home with them and the interest they showed in their life at school. We asked the school directors about their expectation of parents and expectations of school from parents. We asked teachers about the participation of parents in their children's school life and in focus group discussions with parents we asked about their participation in their children's life at school.

Parent's interest and engagement with their children at home

Parents have a strong interest and actively engage with their children at home. All students report their parents provide a home with all the necessary comforts for them. They also report they eat meals together with their parents (92%) and their parents spend time talking to them (82%) every day. Moreover, 25% of students indicate their grandparents live with them, eat meals with them and spend time talking to them.

Parents interest in their children's life at school

Parents take an active interest in their children's life at school. Students' report their parents provide many facilities at home to support their learning. They have a place to study (84%), a desk at which to study (89%) and books to help them in their studies (86%). They also have computers (44%) connected to the internet (36%) and cell phones connected to the internet (90%) which they use for their studies.

Students responses to statements related to their parents' interest in their life at school clearly show that their parents take a substantial interest in it. Students observed that '*every day*' their parents discuss with them what they did at school that day (62%), encourage them to get good grades (66%), discuss their performance with them (48%), encourage them to complete secondary school (46%), discuss what they are learning at school (46%), encourage them to obtain further education (43%) and inquire about problems at school (32%).

Teachers also report parents' interest and involvement in their children's school lives. Teachers report parents often make individual visits to the school (16% *once a week*, 37% *once a month*) to inquire about their children and regularly attend parent meetings at school (14% *once a month*, 82% *once a quarter*). Parents also attend workshops held for them (7% *once a month*, 32% *once a quarter*) and the teachers' open lessons (15% *once a month*, 30% *once a quarter*).

During the focus group interviews parents stated, 'I went to visit my granddaughter's teacher to find out about her performance' and 'I visited the school last week to attend open classes of my three children' (school A). At another school, they said, 'Last time I came to the school was for the parents meeting in February. Besides parents' meetings, I also come to participate in the open classes' (school S). Teachers also indicate '*always and often'* parents take the initiative to discuss their child's behaviour or academic progress (70%) and seek advice from the school on how best to support their children with their schoolwork (48%). 43% of the schools '*always*' inform parents about their children behaviour and academic progress.

Parents expectations of school

Parents have high expectations of their children's schools. These expectations are reflected in parents' response to their choice of school for their children. Parents state they chose the school because it was the 'best in the area'. More specifically it had qualified and experienced teachers, good physical and learning conditions, and obtained top positions in competitions. Parents preferred schools where Russian is the medium of instruction or where the teaching of the Russian language is good. They also chose schools where the teaching of English language was good and schools that participated in the Future Leadership Exchange (FLEX) programme, which provide students with an opportunity to spend a year in the United States, living with a local family and studying in a high school.

Parents high expectations of the school are also reflected in the areas they want the schools to focus on to facilitate high academic achievement of their children. In interviews with parents they state they want schools to ensure their children are fluent in Russian and English, learn the sciences well and develop good ICT skills. In addition to developing knowledge and skills in the subjects taught at school, they want their children to learn the values of respect for elders and service to others.

School directors were asked to identify which statement best characterizes parental expectations towards their school. 55% of school directors report the 'majority of parents put pressure on schools to achieve higher academic standards'. To help the school to meet the high expectations of parents, the school directors expect parents to notify the school of any problem students have at home or with classmates (95%) and ensure their children complete their homework (90%). The school directors also expect parents to serve on committees (100%), raise funds (85%), volunteer for school projects and programmes (85%), assist teachers on field trips (70%) and even serve as 'teacher aids' in the classroom (70%).

In response to the question, 'Does the school meet your expectations?' Some parents state the school meets their expectations while others indicate the schools do not. The parents who indicated the schools meet their expectations provided the following support for their position: the school has teachers for every subject, organises after-school activities, students participate in both in-school and out-of-school competitions, and the school organises lessons for parents on how to bring up their children. Parents who indicate the schools do not meet their expectation do so because 'the school has too many students'. This was acutely felt by parents in the school that operated in three (3) shifts and parents in a few other schools where the class size was large (40 students). In addition to a general lack of space, parents also complained about the lack of infrastructure and facilities. In one school parents complained of a lack of a heating system and in two schools they pointed out to the lack of a gym. With respect to teaching and learning the biggest complaint was the lack of laboratory equipment. In some schools, parents also complained about the lack of qualified teachers and that teachers were not using new technologies for teaching. Parents wanted more after-school classes in English, Russian, ICT and music to be offered. Learning to play the *Komuz* (the local musical instrument) was important to parents in schools that did not offer this facility.

Parents role in school functioning

There is a long-standing tradition of parental involvement in schools in Kyrgyzstan. In Soviet times schools were required to have a PC. After independence, schools have continued with this tradition. In some schools there is a single PC, while in other schools there is a PC for each grade. Furthermore, in 2009 the MoES issued a regulation on setting up Boards of Trustees (BoT) for state and municipal education organisations, giving parents a role in school governance. To-date, however, not all schools have a BoT. Where a BoT has not been set up, the PC serves this role. In this study nine schools have a BoT.

According to the parents, both PCs and BoTs are democratically elected bodies. Parents of students studying in a class or parents across the school elect parents to the PCs. Members of the PCs elect the 3-4 members of the BoT. The PCs generally meets once a month whereas the BoT meets once or twice a year. Parents also report that PC members visit the schools weekly to meet with teachers and students and help organize various school events. The head of the PC and BoT visit the school at least once a month to check on any work being done to improve the infrastructure of the school, check on the finances, write reports, as well as meet with teachers and students to discuss issues related to education improvement.

The administrators, teachers and parents report that members of the PCs and BoT play an active role in the school especially in the areas of governance, providing monetary and non-monetary support for teaching and learning and serve as a bridge between the school and parents.

Governance

The school administrators report that 40% of parents participate in school governance as members of the PCs and BoTs. A key role of the BoT is deciding school policies and the school budget. The BoT shares decision-making power with respect to school policies with the school director and in the case of the school budget with the local education authority and the school director. The BoT plays a key role in decision making with respect to the elective subjects offered by the school (46%) and choosing textbooks from those approved by the MoES (36%). The BoT also plays a key role in deciding the student admission policy (63%), the student disciplinary policy (70%) and the grading and assessment policy (57%). In addition, the BoT has a shared responsibility for formulating the school budget (22%) and determining budget allocations (32%).

Monetary support for the school

A key function of the BoT is to raise money for the school, manage the money and present an audited report at the end of the year. School directors report the school raises 2.1% of the school budget from parents' contributions and donations. This money is used to improve the school infrastructure and resources by purchasing equipment such as computers and smartboards, furniture such as desks and chairs, and school supplies such as chalk and dusters.

The BoT also raises funds to attract qualified teachers to the school (e.g., the BoT in a school paid the rent of the apartment for a teacher) and to reward outstanding teacher performance. In addition, it raises funds to support student learning by purchasing or renting textbooks, paying for elective courses for students in grades 10-11, supporting school clubs, for students' excursions, participation in competitions and for outstanding performance awards.

Non-monetary support for teaching and learning

The school administrators and teachers report about 40% of parents support teaching and learning in the school by facilitating the organisation and conduct of co-curricular activities such as clubs, excursions and events on a *monthly* to *quarterly* basis. PC members also attend the 'open classes' of teachers and support them by bringing various household items required for conduct of activities in their lessons.

Serve as a bridge between parents and the school

The school directors report members of the BoT also work to build relations with the parents (33%) and the larger community (30%). PC members not only attend the parent meetings and various events organised by the school themselves but also encourage other parents to do the same seeing this as an opportunity to support both teachers and students.

Relationship between school and parents

The school administrators state the relationship with parents and the larger community are 'good' or 'close'. The parents also report they have a 'good' relationship with the schools. This relationship is surely facilitated by the fact that the schools provide a welcoming and accepting atmosphere for parents to get involved, is open to suggestions and feedback of parents, and acts upon the decisions taken at the parents meeting. Teachers report '*always*

and often' parents give suggestions and feedback on school matters (75%), the school acts upon the decisions taken at parent meetings (92%) and parents follow up to ensure the decisions are implemented (76%).

Communication

The school directors report (*always & often*) high levels of communication initiated by the schools on a regular basis to inform parents about school programmes and their children's progress (95%). The teachers report (*always & often*) the school regularly informs parents about their child's behaviour and academic progress (89%). They also regularly (*monthly, quarterly*) hold parents' meetings (14%, 82%), conduct open lessons for parents (15%, 30%), and organize seminars/workshops for parents (7%, 32%) on ways to assist children with schoolwork.

The communication is two ways. Parents seek advice (*always & often*) from teachers on how best to support their children with their schoolwork (48%). Parents give suggestions and/or feedback on school matters (75%) and are involved in decision-making (92%).

The school directors report using a variety of communication channels to communicate with the parents. These include cellphones, gradebook, parents visits to school and parents' meetings. The frequency of communication ranges from *once a week* to *once a quarter*.

Collaboration

From the schools' perspective, the collaboration between school and parents is very good. All the school directors report they provide a welcoming and accepting atmosphere for parents to get involved (100%), involve parents in planning and implementing curriculum-related activities (100%) and include parents in school decisions (95%). As a result, there is a high level of participation of parents in school governance (40%) and volunteering in the conduct of co-curricular activities (38%).

From the teachers' perspective, the collaboration between the school and the parents is very positive. They report parents regularly (*always & often*) give suggestions and feedback on school matters (75%), the decisions made at the parent meetings are acted upon by the school (92%), and the parents actively follow up to ensure their decisions are implemented (76%). The school keeps the parents informed of their children's behavior and academic progress (89%).

The parents' also report a good collaborative relationship between them and the school. They try to facilitate the school as much as possible and appreciate the fact that their suggestions are considered, and decisions are acted upon.

Barriers to parents' participation in school

More parents want to participate in school activities, but time appears to be the main barrier to their participation. Parents informed the researchers that they choose members for the PC and BoT from among those parents who have time to visit the school at least once a month and would be available in case of emergencies. This requirement usually makes it difficult or excludes those in full-time employment. Volunteer opportunities are only available during school time, making it impossible for working parents to volunteer. School meeting are often

organized during the day making it inconvenient, if not impossible for working parents to attend.

Summary

Parents' have a strong presence in their children's lives at home and at school. The parents care about their children's well-being as well as their academic performance. They also play an important role in the functioning of the school, participating in its governance, providing monetary and non-monetary support and serving as a bridge between the school and the parent community. Some parents find it difficult to get involved and schools must find ways to remove these barriers as far as possible. The high level of parent involvement is an asset in the equation of an education system.

Key Findings and Policy and Practice Implications

Key findings

- Parents take an active interest in their children's lives at home. All students report their parents provide them with all the necessary comforts at home. 92% report they eat their meals with their parents and 82% report their parents spend time talking to them every day.

- Parents also take a substantial interest in their children's lives at school. Most students' report their parents provide many facilities at home to support their learning such as a place to study, a desk at which to study and books to help them in their studies. They also have computers and cell phones connected to the internet which they use for their studies. Moreover, two-thirds of their parents make time every day to discuss with them what they did at school that day and encourage them to get good grades.

- Parents have high expectations of schools, choosing schools based on their academic programme, and pressuring schools to achieve high academic standards. Specifically, in the areas of Russian and English, sciences, 21st century competencies and the values of respect for elders and service to others.

- Not all parents feel schools are meeting their expectations. They believe teaching and learning is hindered by lack of infrastructure, science laboratory equipment, qualified teachers, lack of technology-embedded teaching and learning and not enough focus on cultural activities such as music.

- Parents play an active role in the functioning of the school. About 40% of parents participate in local school governance, 38% in supporting teaching and learning at the school through provision of monetary and non-monetary support and serving as a bridge between the school and the parent community.

- Both parents and schools indicate a good relationship facilitated by frequent communication and collaboration.

- More parents want to participate in school activities, but timing of school meetings are inconvenient.

Policy and practice recommendations

Build on the existing strong parent-school relations

The relationship between the schools and their PCs and BoT have been very positive and strong. This positive relationship should be maintained so that the parents continue to provide support and make decisions in the interest of providing quality education to their children. Parents' involvement in the school's governance, operations, as well as supporting teachers in co-curricular activities will help build a community where the common goal of all members is to help the students reach their full potential.

Provide informal learning opportunities for children

Parents should be encouraged to provide informal learning opportunities for their children including registering them in after-school clubs, taking them on visits to museums, and providing a variety of experiences in their homes. Informal learning is often supported by technologies, including social media and gaming. A U.S. National Research Council study on gaming used in after-school clubs found 'positive effects on students' computer literacy, comprehension, problem solving, and strategic efficiency' (National Research Council, 2012, p. 154). Students report using technologies for learning and playing video games, schools can facilitate parents by identifying lists of games that students can play to further develop skills.

Educate parents in the ways they can facilitate their adolescent children's education

Research shows that parental involvement in their children's school life has an impact on students' achievement. Parents have a strong presence and are actively engaged in their children's education at home and at school. However, too much support for adolescents such as helping with homework or getting things they need for schoolwork can have a negative impact on student academic achievement (PISA 2017). Parents must be educated on how best to facilitate their adolescent children's education achievement.

Remove the barriers to parents' participation in school life

Schools must remove the barriers to parents' participation in school life by using technology to communicate with parents and scheduling activities to facilitate participation of working parents.

Section XI: CONCLUSION

The results of this study indicate there are several strengths in the Kyrgyz education system and in schools which can be drawn on to facilitate student academic achievement. It also identifies the considerable challenges the schools face in providing quality education to students. Policy and practice recommendations for improvement have been prioritized and made in the previous sections of this research report.

Strengths

Transform clear directions for education into reality

The Education Development Strategy 2012-2020 sets out ambitious targets for developing the education sector and the State Standards for Education seeks to facilitate students' development of the 21st century competencies and their application to the real-world, to improve the quality of education and student achievement in Kyrgyzstan. It also provides a budget for school education comparable with the OECD average. Kyrgyzstan needs to better utilize the budget to achieve its goals for education.

High levels of collaboration in schools

A strength of schools in Kyrgyzstan is the high level of teacher-teacher collaboration. All schools have a policy that encourages teachers to share and discuss teaching ideas and materials as well as teaching issues. All the teachers report collaborating with their colleagues by sharing materials and discussing ideas about teaching and learning. Nearly all the teachers observe their colleague's lessons and provide feedback. Moreover, they find these professional development activities have a high impact on their teaching practice.

School directors share administrative and instructional responsibilities with several staff, which is a strength of the schools in Kyrgyzstan. The fact that 80% of school directors have been teachers and some continue to teach, is also a strength.

High level of parental involvement

Parents' strong support and engagement in their children's lives at home and in their education at school is an asset in the equation of an education system. The parents care about their children's well-being in all its dimensions. They have high expectations for their children's education and pressure schools to ensure high academic achievement. They also support the schools by their active participation in school governance, providing monetary and non-monetary support and serving as a bridge between the school and the larger community.

Challenges

Shortage of schools

The shortage of schools puts pressure on existing schools so that some must run two-shifts and even three-shifts. A short school day with fewer hours of instruction, may put students, especially those from disadvantaged backgrounds or those who are struggling, at risk of failure. The government of Kyrgyzstan should build more schools in areas of need, ensure

there are no three-shift schools and identify ways to minimize the impact of two-shift schools on teaching and learning.

Purpose-built schools lack infrastructure and resources to support teaching

Most schools are housed in purpose-built buildings with adequate lighting and heating systems. However, inadequate infrastructure, facilities and teaching and learning resources is a prevailing issue in all schools and for all subjects. Most schools have science laboratories, but the equipment is outdated, in disrepair or insufficient and materials for experiments largely unavailable. Lack of sufficient computers connected to the internet make teaching the subject of informatics very difficult, if not impossible. It also limits ICT embedded instruction in the other subjects. The shortage, obsolescence or non-availability of resources really sets back the teachers' abilities to effectively teach their students. Inadequate number of textbooks presents a serious problem to students' learning. Teaching and learning of the subjects remain limited to information transmission and comprehension rather than critical and creative application of learning to new situations.

Inadequate support for teacher professional development

There are no professional standards for teachers clearly delineating what they should know. be able to do and the character qualities they should have. Professional standards for teachers would be useful in determining what initial and continuing professional development should aim to achieve. It would also facilitate decision making about teacher recruitment and career advancement.

In this study, most teachers were confident with teaching the curriculum of their subjects, but at the same time they expressed a high level of need for enhancing their subject knowledge and pedagogical skills. Though this data point is from in-service teachers indicating their need for keeping current in the knowledge and pedagogy of their own subject area, this raises issues about the quality of initial teacher education and may also potentially imply that there is a need to ensure a solid preparation in subject knowledge and pedagogy during initial teacher education. Developing students ICT skills, teaching thinking skills and soft skills are also areas the teachers feel in high need of professional development in order to help equip students with 21st century skills.

Currently, the support teachers receive for professional development is scarce and does little to meet their needs. Teachers in Kyrgyzstan are only eligible for seventy-two hours of professional development external-to-the-school every five years. With the inadequate support for teacher professional development, it is difficult for teachers to keep current in their field. This may explain the teachers' inclination toward peer observation and discussing informally ways to improve teaching as support for them to participate in external professional development activities are largely absent. Collaborating with colleagues within one's own school is necessary for teacher improvement and is a strength of schools in Kyrgyzstan. However, updating themselves with new teaching, learning and assessment strategies is also necessary to keep current and innovate their own practice.

Inadequate support for school directors' professional development

Similar to teachers, professional standards delineating the knowledge, skills and attitudes for school leaders must be developed and used to facilitate their recruitment, professional

development and performance appraisal. School leaders must be required to undertake professional development prior to assuming the position. Moreover, school leaders also need continuing professional development to keep current in their practice and provide instructional leadership in keeping with new developments.

Student's inadequate exposure to and use of digital technologies

14.4% of the students have never used a computer. This is a high percentage of students not having a chance to use a computer in the context of the 21st century with the ubiquitous use of technology in all sectors of life. Most students also report relatively low usage of computers at school for various purposes. This is most probably due to the lack of computers with internet access in the schools and teachers' inexperience in ICT embedded teaching and learning.

Opportunities

High student motivation and engagement in learning

Students have a very positive attitude towards learning with the majority reporting they enjoy studying all their subjects. However, they are more likely to memorize subject content than relate new information to previously learned material or to real-world situations. These study behaviors have a direct relationship with how the teachers model learning as well as the nature of the class and home assignments most of which require memorization or repetition of lower order cognitive tasks. The students need to be guided to more conceptual and contextual ways of learning.

The students are also very confident of their academic and problem-solving abilities. They also have a very positive outlook and high expectations for their future education and career. 78% of the students expect to have at least a university level of education and careers in healthcare, IT, education, and business. Having high education expectations and a goal for the future provides a base to motivate students to improve their academic performance in STEM, ICT and English, and develop 21st century skills to reach their goals.

Contemporary education philosophy, traditional teaching practices

Most teachers hold a contemporary educational philosophy. For example, the teachers believe students should be allowed to search for their own answers or solutions to problems and the teacher's role is to facilitate students' own enquiry. However, the teachers also believe effective teachers should demonstrate the most appropriate way to solve problems and they should be the ones who determine what activities should be done in the class. Interestingly, these responses seem to conflict with each other suggesting that the teachers hold both contemporary and traditional views of teaching practice. Multiple points in the data however, show that teachers' actual instructional practice is still teacher-centered with teachers having students read from the textbooks or demonstrating the steps for solving a mathematics problem as the main teaching techniques. Given these findings, professional development programmes must help teachers recognize and acknowledge the inconsistency between their educational belief system and their actual instructional practice as well as provide them with knowledge and skills required to implement constructivist or active learning pedagogies in their classrooms.

High class cancellations and student absenteeism

All the efforts to promote student learning may be thwarted by the high rates of student absenteeism and class cancellations. About a quarter of the students sampled report missing the entire school day, missing some classes, or being tardy at least once a week. These student absenteeism rates are high and present a problem to their learning. Combining this issue with the high rate of class cancellation and interruptions of learning due to teachers being called to fulfill other administrative duties may be more detrimental than some of the other challenges discussed here.

Teacher Shortage and Recruitment Difficulty

Teacher shortage is an imminent problem and will considerably impact the education system in Kyrgyzstan on many levels if it is not dealt with immediately and properly.

In this study, the highest number of teachers fell in the age group of 50-59 (35.7% of the teachers). According to Kyrgyz retirement and pension policy, the new general age for retirement is 63/58 (men/women) and early retirement is 60/55 (men/women). Moreover, for teachers who live in high mountainous regions, the retirement age is 58/53 (men/women). This means that about one-third of teachers (age group 50-59) in the sample are either eligible for retirement or already retired but returned to teach due to the teacher shortage in schools. There is a big drop in number of teachers in the age group 40-49 compared to the age groups of 50-59 and 30-39. This gap presents a teacher shortage issue that is waiting to happen in as soon as 5-10 years. Although the number of teachers in the age group of 30-39 is back up to a more acceptable level, the potential issues that might occur during the 10 years gap should not be overlooked. Age 30-39 was the second largest age group in the sample. Again, they will be eligible for retirement in roughly 15-20 years.

An imminent threat that would worsen the problem of teacher shortage is the sharp drop in the number of young teachers under 30 years. There are only 3.6% of the teachers under the age of 25 and only 7.1% of the teachers are between the age of 25-29 indicating that a low number of young people are entering the teaching profession. The low number of teachers who are under 30 presents a real threat to the quality of secondary education in Kyrgyzstan as the number is currently at dangerously low levels. This profile of the teachers presents a threat to the sufficiency in the number of teachers in schools in the next 5-20 years if the number of new teachers does not increase significantly.

That schools are having difficulty recruiting qualified and experienced teachers especially in science and mathematics is an alarming sign. The coping strategies that the schools employed at the time of this study were, for example, hiring less qualified teachers, hiring retired teachers or adding courses to the teaching load of existing teachers. These coping strategies might alleviate the immediate issue. However, the negative impact of not having qualified teachers will show quickly on student achievement if the issue is not addressed in a timely manner.

The causes of the current and forthcoming teacher shortage and the difficulty in recruitment are systemic, such as low salaries, low status of the teaching profession, low number of teachers entering the teaching profession and high in-service teacher attrition rates. Systemic changes are necessary and recommended to improve the situation.
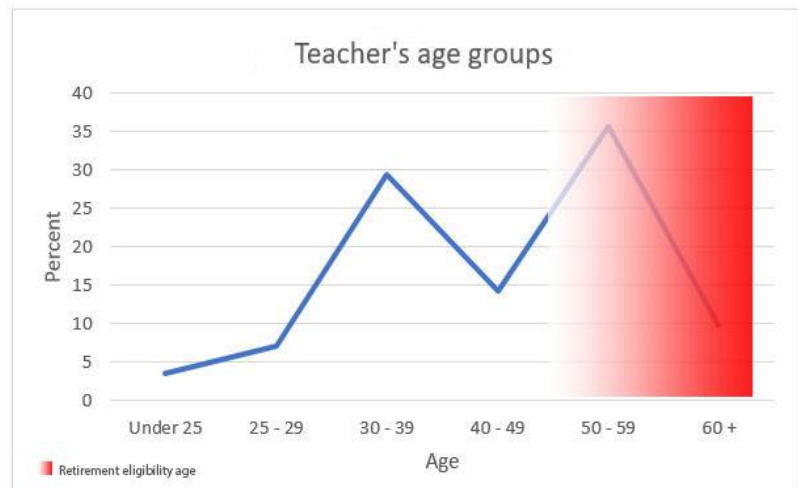

Figure 14: Trends of teachers age

Poor remuneration for teachers

Teacher remuneration is very low, forcing teachers to increase their teaching load, reducing time for preparation and reflection. Low salaries are probably the cause of the difficulties with teacher recruitment and could potentially be a factor in their attrition. However, teachers salaries including salary increases are determined by the MoES so schools do not have the power to change or individualize teachers pay.

Inadequate system of assessment of student learning

Assessment in schools and at the national level in Kyrgyzstan is focused more on assessing reproduction of knowledge and comprehension rather than the higher levels of application, analysis and creativity. Lesson observations show teachers giving students marks on a 4-point scale at the end of each lesson. Students were not told what they could do to improve their performance. Quizzes and tests are also common and focused on assessing knowledge acquisition. The ORT is also largely focused on assessing students' knowledge and understanding. It is a well-known fact that these high-stake examinations greatly influence teaching and learning in the classroom.

This study has already outlined several recommendations to address the threats and challenges, build on the existing strengths and take advantage of the opportunities. It is imperative that policy makers and practitioners act on these recommendations to ensure students graduating from secondary schools are well prepared for further education, work and can contribute to the socio-economic development of Kyrgyzstan in the 21st century.

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