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Between Pedagogy and Technology: A Two College Case Study - Training Israel's Teachers to Meet the Challenges of the 21st Century

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ABSTRACT

Since 2012, the Israeli Ministry of Education has administered a program to prepare the education system for the requirements of the 21st century, beginning in the state's peripheral regions. The program aims to establish innovative pedagogy in schools by introducing the use of information technology. The program necessitates changes in pre-service teachers' training in the teacher-education colleges. The article focuses on two teacher-education colleges in Israel's peripheral regions, which are attempting to prepare their graduates for their future role by equipping them with skills for the dynamic 21st century digital culture. It appears that it is insufficient to train these teachers to use existing technology in school; they must also be equipped with appropriate skills for the use of new technologies that will enter the schools in coming decades. The article shows how these two colleges are coping with the training of future teachers for this digital era, developing innovative teaching-learning processes as an integral part of pre-service teachers' training.

KEY WORDS

21st century skills, Information and Communications Technology (ICT), Information Technology (IT), Teacher's image in the digital era, Teacher-education, Innovative pedagogy for the digital era, Professional development of pre-service teachers, Periphery. Pre-service teachers, Learning-teaching process

INTRODUCTION

In recent years education systems throughout the world have undergone a transition involving paradigmatic changes from systems based on local standards to systems based on universal standards; from closed systems to interactive and collaborative systems; from systems based on uniformity to systems focusing on difference. In the second decade of the present century the educational act has altered its appearance. The school, whose role it is to prepare a generation of future graduates, has to become familiar with the world of modern youth and to know what they will be required to know in coming decades. Among other duties, the school needs to impart necessary skills so that its graduates can cope successfully with the challenges that they can expect in tomorrow's world. The changes which the world and its education systems are presently undergoing in the digital era have implications

for the teacher's image and for the act of education.

From the academic year 2012, the Israeli Ministry of Education has administered an innovative program for the adaptation of the education system to the requirements of the 21st century in the peripheral Northern and Southern regions of Israel. The purpose of this program is to introduce an innovative pedagogy in Israeli schools through the assimilation of information technology. This new pedagogy includes novel teaching and learning methods, in which the studied contents and knowledge are relevant to the continually altering contemporary reality and are easily accessible to all through an Internet network. In parallel to the assimilation of knowledge, students acquire relevant skills for optimal functioning in the 21st century [1].

Information Computer Technology (ICT) includes any computer and communications technology used to manage information. In the education field, ICT is used for computer-assisted learning, on-line learning and investigative computer-based learning. ICT has impacted learning-teaching processes. A correct blend of ICT with innovative pedagogy can enhance teaching quality, improving teachers' skills and class management (follow-up of attendance, student achievements, and checking progress with learning material according to the learning program).

In the learning fields, ICT influences the students' focus of attention; it increases the level of interest since it is relevant to the children's own world and creates a continuum between learning in class and in the home. Additionally, it improves communication between all stake-holders in the learning-teaching process (teachers, students and parents) and contributes to the development of high order thinking and meta-cognition.

Two hundred schools are included in the Ministry of Education program, half of them in the South of Israel and half in the North. In these schools a basic computerized learning environment is provided including a portable computer for the teacher, screen, loudspeakers, Internet, interactive whiteboard and means to darken the classroom. As part of this program teachers are asked to use the computer for their classroom teaching and computerized pedagogic administration [2]. This program has impacted on school teaching-learning processes.

The latest research literature describes attempts to assimilate 21st century skills in various world education systems. It deals with the contribution of ICT to the different education circles. For example: the creation of a virtual research environment of lecturers on the web (using Wiki applications) encouraged their work as a collaborative academic research community [3].

Research has also shown that future pre-service teachers can act as agents of change in the institutions in which they work, in the initial stages of their induction into teaching. They can potentially facilitate the assimilation of technological practices in teaching-learning processes [4]. Ciampa and Gallagher [5] describe a process of supervision and guidance for elementary school teachers in Canada as they

adopt multimedia laptop technology and introduce it into the teaching-learning processes.

The Israeli program for the assimilation of 21st century skills does not include consideration of suitable training for pre-service teachers. However the program necessitates changes in the teacher training courses in Israel's teacher-education colleges.

This article relates to the Israeli education system, focusing on the skills required by a teacher-education college graduate. It describes the way in which two peripheral colleges in the North and South of Israel train pre-service teachers for their work in the education system in accordance with the needs of the 21st century.

1.1 21st century skills according to the Israeli Ministry of Education

In 2009, the Ministry of Education decided to introduce the subject of 21st century skills into Israel's education institutions and schools. The types of skills mentioned in the ministry's publications, were drawn from articles and other publications by Israeli and international researchers and educators. This decision had many consequences, on the practical level of policy implementation, at the level of teachers' professional development, at the pedagogical level and at the pedagogic administration level. The decision relates to the entire education system including the stage of teacher-education [6]. The skills to be developed include:

Intelligent use of digital tools

Most young people have mastered the digital media. In the main computers are used for pleasure, games and interpersonal communication and not particularly for learning purposes. The need for ICT skills necessitates various skills that have been described by different scholars. Doyle [7], Passig [8] and Melamed [9] each noted skills such as:

- Formulation of questions based on information needs, identification of potential sources of information, developing successful search strategies, accessing sources of information through the computer or other technologies, assessing the information attained, organizing the information into a practical representation, integrating the new information with the individual's existing information, using the information in a critical thinking process and in problem-solving [10].
- Choosing suitable information to solve different problems [11].
- Planning and performing search processes and organizing information for the investigation of an issue or for problem-solving, processing the information by critical examination in accordance with the objective, deducing conclusions, creating, presenting and distributing new knowledge [12].

The following skills were also mentioned in EXPERT 21 and in reports of the National Council of Teachers of English (NTCE):

- The use of technology for the needs of communication, organization of information, assessment of sources, data analysis, development of a research program [13].

- Development of specialist skills for the use of a technological tool to produce information for learning purposes. And also the organization and analysis of different streams of information that are received simultaneously [14].

High order thinking

Various types of high order thinking were noted by different scholars as necessary for the use of 21st century skills:

Problem-solving – solving open questions and complex situations [15].

Critical, analytical thinking and evaluation – assessing alternative possibilities, judging arguments [16]; considering evidence, awareness of different opinions, finding cause/results connections, evaluating possibilities and hypotheses (alternatives) [17]; using information in a critical thinking process in order to solve problems [18]; deducing conclusions and drawing logical inferences, making quantitative deductions, analytical ability, assessment, integration [19]; analyzing scientific processes, evaluating information, using critical thinking to critically examine and evaluate multiple sources of information and a large amount of knowledge, improving thinking capability, encouraging development of high order thinking skills [20]; creativity, innovativeness and inventive abilities – producing new ideas from an old idea, creating new meaning for existing and new symbols [21].

Shared Learning

Shared learning is the comprehensive name for a large number of learning-teaching methods and relies on social skills, including the ability to communicate, to share things, to construct an effective team, to solve problems and to resolve confrontations [22]. In order to work within a team, an individual requires communication skills, cooperative abilities, leadership and interpersonal skills [23].

Shared learning includes 'cooperative learning' that aims to create a joint product and 'collaborative learning' that stresses the shared process. Both necessitate a culture of discourse and critical dialog [24]. Collaborative learning requires skills relating to interaction with others in the online community and sharing of information with global communities [25].

Independent learning

This involves autonomous learning over time. Martin and Madigan [26] indicate the need for the skill of life-long learning including the ability to create links between different areas of knowledge in order to produce new insights.

Ethics and limitation on the web

Ethics and guided use of the web are two skills that equip the independent learner with the ability to begin to work on the net in an ethical manner, to recognize the laws of copyright, to maintain privacy, to maintain values and morality and not to harm others. On the other hand they equip the learner with awareness of the risks on the web and the need to work with responsibility and caution.

2. THE TEACHER'S IMAGE IN THE PROGRAM FOR ADAPTATION OF THE EDUCATION SYSTEM TO THE 21ST

CENTURY: FROM A TRADITIONAL METAPHOR TO NEW MODELS

As noted, the transition to the digital era and the alteration of paradigms in the field of education influence the teacher's image and characteristics and the learning-teaching process. Stumpenhorst [27] claims that while the 20th century teacher possessed much knowledge, the 21st century teacher also needs to command technological abilities. The 21st century teacher masters the different communications media and Internet and needs to know a range of digital tools for online learning and teaching. An additional dimension of the contemporary teachers' work is that they have to become 'reflective practitioners' and must continually flexibly adapt and fit themselves for the continuous changes in the education field [28].

Beck [29] notes metaphors that describe the traditional teacher's image. The first is the analogy of the funnel that sees the teacher as resembling a 'transmitter' (in the traditional sense where the 'transmitter' is responsible for the exact transfer of the tradition from generation to generation). According to this analogy the child is seen as an empty container that must be filled with content (knowledge and values). In the learning process the container is filled with 'material' that is poured into it by the teachers. The teacher constitutes the 'funnel' or 'pipe; whose duty is to pour the 'material' (spiritual heritage, culture and science) from the reservoir (adult society) into the container (the student). The teacher as the representative of the adult world 'knows what is good for the child' - the teacher teaches the child the things that society sees as appropriate and essential for their proper assimilation within the society.

The second metaphor draws an analogy with the midwife – each child has knowledge with which they are endowed from birth. The learning process aims to bring this knowledge into practice and this is done by activation through a set of questions that ask the learner to 'think'. Thinking, subject to the laws of logic, stimulates the covet answer to rise above the surface. The teacher resembles the midwife since they merely help the act to occur, to come out. The teacher does not 'transmit' knowledge or create it but simply enables the learner to expose the knowledge, with the help of suitable stimuli. The teacher asks questions, that the student can deal with, and after a process of trial and error the correct answers are attained.

The assimilation of 21st century skills in the field of education requires an alteration in the teaching-learning process and the teacher's image. Siemens [30] mentions several models, taken from different worlds that describe the teacher's image in the digital era:

- The teacher as 'concierge' – the teacher adapts content and recommends the learning method. The teacher uses 'soft and personal instruction' supervising the learning personally while delivering the teacher's knowledge and recommendations for further research [31];
- The teacher as a 'network administrator': the teacher guides the scientific process, accompanying the learner in the creation of a

'personal information network' so that they can perform the task by developing skills relating to information and criticism. The teacher guides the learner to perform reflection on their personal learning processes [32]; the

- The teacher as the 'master artist': Seely [33] drew inspiration for this model from the studio (work space), an open space in which artists create and where they can exhibit their works. In this learning style the students do not only learn from the teacher's skills as an expert and from their interaction with the teacher, they also learn from the activities of their peers and from their interaction with the teacher. In this manner collaborative learning is formed in which the students serve as sources, influence and inspiration for each other.
- The teacher as 'curator': the teacher creates the learning space. Autonomous learning takes place in this space. The teacher exposes the learners to major challenging sources of knowledge that can be investigated, to find links and to create knowledge [34].

The teacher-education college graduate in the digital era is a computer-literate graduate skilled in four aspects: (1) technological literacy, (2) adept in use of computers for academic purposes, (3) adept in use of computers for teaching purposes and (4) skilled in the ethical aspect of professional practice.

The future teacher acts within a dynamic digital culture, and therefore, the present technological education from school is insufficient for teacher training and their training must also include state-of-the-art technologies, which have not yet been integrated in the school although it is expected that they will find their way into schools in coming years. The teacher-education college graduate must be familiar with the new technologies that will capture a more and more central importance in teaching and learning for themselves and their future students. They should actually use these technologies in their daily work, and harness these technologies for professional, academic and practical purposes in an intelligent manner. They need to have a broad vision concerning the place of computerization in Israel and worldwide, and should be familiar with the processes needed to introduce computerization and with developing research in this field and be able to evaluate the implications for the integration of computerization in education in Israel and abroad. These pre-service teachers will be expected to use computerization to enhance their teaching, assimilating innovative teaching and learning paradigms, that lever and serve as a catalyst for computer use. They will use computerization beyond the limits of time and location, and be able to intelligently harness computerization beyond the immediate practical needs of the school, exploiting the computer-enriched environment in the students' homes. They will also serve as teacher-researchers, taking care to continually update and improve their professionalism over their life, enlisting the Internet as an interactive source for professional development [35].

3. IMPLEMENTATION OF THE PROGRAM FOR THE ADAPTATION OF THE EDUCATION SYSTEM TO THE 21ST CENTURY IN TEACHER-EDUCATION COLLEGES IN NORTHERN AND SOUTHERN ISRAEL

Kaye Academic Education College is located in the southern town of Beer Sheva, regional capital of the Negev desert. Ohalo Academic Education College is situated in Katzrin, the regional capital of the northern Golan Heights. Both colleges educate teachers for a first academic degree in education and teaching. The colleges apply Ministry of Education policies concerning the program for the adaptation of the education system to the 21st century; each has developed various courses to implement learning and teaching appropriate for the adaptation program. These programs include four stages in line with the pre-service teachers' four years of study. The first three stages take place simultaneously with the regular teacher training program and the fourth stage takes place in in-service training when the pre-service teacher works in school while continuing their studies in the college.

The Kaye College program is known as the FGIN program, the Ohalo College program is known as CMEI.

3.1 Kaye college program (FGIN)

The anagram that represents this course includes the following subjects

F-First year program

G-Getting experience

I-ICT and innovative teaching experience

N-Novice teachers

The First Year program is intended to train pre-service teachers in their first year of academic studies. It has run since 2008 as a new organizational and pedagogic frame for pre-service teachers and college lecturers. The program cuts across the different training streams – programs and specialization courses – administered by the college. Planning and processing of the details of the learning program is performed collectively by the lecturers in Year 1 but the learning is performed within the separate classes. The program includes four core subjects assimilating skills for the 21st century with the help of digital tools:

1. 'Digital and scientific literacy' the pre-service teachers are required to write a Wiki-item on a concept in the education field studied during their college course. In order to write this item they are asked to use academic resources to search for articles and books and also to use reliable Internet sites. Throughout the process they are required to conduct critical work with information and they learn the norms of academic writing. The writing is performed collaboratively both in writing the item and in the evaluation of the items of their peers.
2. 'Personal professional identity' deals with the pre-service teacher's personal and professional development, aiming to guide their growth process at the beginning of their teaching career. This subject is founded on personal-professional identity formation through a reflective perception. The subject

is studied in workshops focusing on self-observation, observation of others, interpersonal communication in a group and the development of the skill of empathy as a central component in the teacher's work. Additionally, the pre-service teachers are asked to perform writing tasks. They write on personal blogs tasks relating to their self-observation while developing awareness of their strengths and weaknesses in relation to teaching. They also investigate their choice of the teaching profession relating especially to their expectations and the internal and external motivations that led to this choice.

3. 'Personal cultural identity' deals with the cultural identity to which the pre-service teacher belongs and aims to clarify the cultural perception for the individual and the group and their values and beliefs. These are recorded in their personal blogs, examining their implications for teaching, since the teacher's role includes the development and attention to a range of different attitudes, and the fostering of freedom of opinion and independent thinking in a multi-voiced culture.
4. 'Education as it is reflected in the field' focuses on learning-teaching processes and 'diversity' among the learners. It is taught with innovative pedagogy based on projects (Project Based Learning – PBL). This constructivist approach familiarizes the pre-service teachers with innovative learning-teaching processes [36].

The pre-service teachers learn and deal with subjects that are meaningful for them through collaborative research with their peers and this learning produces products that are valuable for them and their surrounding environment [37]. The integration of pedagogic computerized tools such as PBL advances the learning processes, for example: the performance of projects involves personal and cooperative learning; the use of a group forum allows them a space in which they can gain advice, deliberate and elicit help from their peers. They use Google.docs to create and write-up collaborative group knowledge. The pre-service teachers also document the stages of their work in personal blogs and write their reflections on the learning process they undergo. The use of data bases helps them to create a reservoir of book sites, links and references relating to a particular subject. Additionally, the data bases serve as their personal spaces and can be used to present the products of their work.

In Year 2 'Getting experience' – the pre-service teachers are asked to manage a self-learning frame in which they identify their learning needs, use information critically, deduce conclusions and attain insights. In this year, they practice teaching in school, as part of their training process. They learn about the managerial and learning aspects of the school and gain experience in computer-assisted teaching, while relating to the needs of the learning program, needs of the learners and the need for evaluation.

Year 3 relates to ICT and innovative teaching experience – the pre-service teachers include components of computerization in their specialist

disciplines. They gain experience in innovative teaching in the training schools. They perform a final project including a methodical process of planning innovative teaching with the assistance of computer skills, practicing teaching and evaluating and reflecting on the innovative teaching.

In Year 4, "in-service training' the pre-service teachers undergo internship and learn as novice teachers in a school. They experience various teaching models and learning environments and prove their ability for intelligent teaching work including the use of discretion in the implementation of learning-teaching methods that they have acquired during their training, integrating computerized tools in their pedagogy.

3.2 Ohalo college program (CMEI)

The anagram representing this course includes the following subjects*:*

C - Creativity,

M - Management,

E- Experimentation

I – Implementation

In 2010 Ohalo College established its vision of training future educators in light of the assimilation of different technologies in the education system. Their program was adapted to fit the four year studies of pre-service teachers, emphasizing the need to adapt training to be suitable to 21st century teaching. Schools in Northern Israel were equipped with a wide range of technological equipment including: computers, interactive whiteboards, and Internet access throughout the school, and training was provided for teachers practicing this teaching in the school. This provided a challenge for the college that needed to alter its training for future teachers.

In Year 1 – 'Creative and challenging thinking skills', the pre-service teachers develop thinking and creativity skills according to a wide range of educational theories such as:

- Bloom's taxonomy
- Gardner's multiple intelligences
- Sternberg's thinking styles
- DeBono's thinking styles
- Perkins' theory of intelligence

This stage is mainly characterized by theoretical learning concerning the fundamentals of education with the integration of high order thinking and reflective abilities. Learning at this stage is accompanied by the use of technological tools found on the Internet.

Year 2 relates to 'management and leadership in organizational change – learning paths development'. At this stage the pre-service teachers learn leadership and management skills for a changing technological world, assisted by Internet technological tools such as open tools (Google.docs, Wiki applications, creation of forums and blogs concerning different disciplines). Care is taken to use technological tools in teaching the different courses (education and different disciplines). At this stage, the pre-service teachers specialize in teaching and management and lead different projects including limited practice in school, in order to introduce the innovations of technological progress into the school, and serving as models

for imitation for the more senior teachers in the school.

Year 3 focuses on 'experimentation in schools & classrooms, specific needs identification and the project based approach'. Learning is characterized by the transition from theoretical learning and partial experience while still in the college to implementation in the different schools. At this stage the pre-service teachers practice the use of computerization skills in their different teaching disciplines (mathematics, sciences, Jewish studies, English language, music and movement). They are asked to perform educational projects in the school, guided by professional mentoring from instructors in the field of education and the different disciplines. The integration of technological means in their teaching constitutes an important stepping stone in their training process.

Year 4 relates to 'in-service implementation and synthesis'. The pre-service teachers serve as novice teachers, in a part-time role in the school. They are mentored by the college staff and Ministry of Education professional mentors. This mentorship begins with a teaching process that challenges both sides involved in the teacher training (the college and the school staff that absorbs the student-teacher). This synthesis with mentorship enables the novice teacher to deliberate, to think and to develop additional tools to cope with the innovative methods of teaching of the 21st century. This stage is characterized by the full implementation of the studied methodology with the integration of technological tools in teaching. The new teacher finds that the school is already equipped with technology that allows them to implement what they have learned and practiced during their college training.

The training process (CMEI) for these future teachers, who will teach the students of the 21st century includes familiarization with innovative skills and pedagogy guided by the colleges' professional staff together with Ministry of Education mentors. This program prepares tomorrow's generation of educators under optimal conditions that include the integration of innovative technology-assisted teaching methods with strong emphasis on teaching-learning processes in the classroom.

3.3 Assimilating 21st century skills – from application to evaluation

Education systems throughout the world are faced with the need to adapt to the information era and to train student teachers to function effectively and meaningful within this reality. The programs of two Israeli teacher education colleges for the assimilation of 21st century skills relevant to new technology and science are presented in this paper. The introduction of these programs necessitated change on three levels: (1) the lecturers (mentors) – who needed to be open to innovations and willing to become professionals in new disciplines needed to adopt changes in teaching styles and perceptions of teaching and alterations in the learning syllabus for the student teachers. (2) the organization – change in the organization's policies, the

technical and pedagogical support system, the infrastructure and resources; and (3) the student teachers – changes in the courses studied and in their training and practical experience in schools. In sum, the assimilation of 21st century skills in teacher education colleges involves the adoption of innovations and organizational change.

Systems Theory may help to explain system intervention processes [38; 39] and contribute to the understanding of social and psychological aspects involved in the changes (Berger & Luckmann, 1966).

Kezar [40] defined eight stages in the introduction of change with the involvement of agents of change (who are usually leaders and directors):

1. Establish a vision together with the staff
2. Analyze the system and staff attitudes towards the goals of change
3. Compare the vision to the existing state of the system and determine priorities
4. Schedule a program including stages, resources, support, training, expected products, communication channels within the organization.
5. Implementation
6. Follow-up and evaluation with the help of data-collection concerning the extent of effectiveness of the change, identifying difficulties and side-effects
7. Forming new policy and standards to establish the change
8. Construct a plan to maintain the change and prevent regression.

All the components of the organizational-system change process are essential. Many reform programs fail due to lack of awareness of the importance of these stages, especially the last three stages [41; 42].

Surry, Ensminger and Jones [43] found that the factors influencing the integration of Information Computer Technology (ICT) in teaching in higher education institutions were: the allocation of budgetary resources, the creation of an infrastructure (materials, hardware etc.), support for policy by the institution's management, staff training and provision of technical and pedagogic support, staff attitudes viewing the change as a means to attain learning goals, and consolidation of evaluation that investigates the influence of the change on teaching.

The evaluation stage shapes the pedagogic and organizational aspects of the institution and the tools used for continuous improvement. The evaluation stage is seen as extremely important to follow up on the assimilation of 21st century skills in the colleges. Thus we suggest an evaluation model to test this assimilation process at the level of the lecturers, the organizational level and the level of the student teachers. This evaluation produces a picture of the status quo in both colleges. For this purpose the RIPPLES (Resources, Infrastructure, Policy, People, Learning, Evaluation) model can be used as suggested by the researchers, Sherry, Ensminger and Jones [44], in the context of the integration of ICT in teaching. An examination of the above-mentioned factors can be used as a foundation for the analysis of factors influencing

the assimilation process of 21st century skills in the colleges.

The research questions encompass the three levels at which the change should take place: the lecturers, the colleges for teacher education and the student teachers:

- To what extent and how do the teacher-education colleges train student teachers to assimilate 21st century skills?
- To what extent and how do the lecturers integrate 21st century skills in their teaching for pedagogic and academic needs.
- To what extent and in which ways do the colleges consent to train the teachers for the assimilation process and support it?

3.4 The research procedure

Two Israeli teacher-education colleges were chosen for the study: Kaye College and the Ohalo College. Each college will conduct a self-investigation whose results will be presented for a follow-up study comparing the two colleges. The study will examine challenges alongside successes, and will identify factors promoting or hindering the process of assimilation of change and the correlation between investment and outputs. Results of the comparative research should hopefully assist the implementation of the assimilation of 21st century skills in other teacher-education colleges.

3.5 The research method

The study will focus on the training programs for student teachers. Both quantitative and qualitative tools will be used to validate the findings.

The study is planned for the end of the academic year 2013-2014, aiming to examine the evaluations and teaching methods that were adapted to 21st century skills. It is hoped that this examination will support the continuation of the assimilation of these skills and the performance of a suitable future program for teacher training.

3.6 The research tools

Evaluative data-collection tools will be specially developed to answer the research questions, including: a questionnaire testing students' attitudes towards the integration of 21st century skills in teaching and learning through their learning and practice experiences in courses conducted at the colleges and in distance-learning courses, using on-line synchronic and a-synchronic environments.

A second questionnaire for teaching staff will examine methods used to integrate 21st century skills in teaching, dealing with the teaching staff's professional development in relation to ICT. It will also investigate the issue of models for the integration of ICT through innovative methods in the different disciplinary courses, in education courses and in pedagogic mentoring. These models will also be tested through the testimonies of lecturers, student-teachers and other college role-holders.

The policy of each college will be checked according to several parameters: the integration of computerization in the college, the process of

assimilation of an infrastructure and technical, pedagogic and administrative support. In this context, evaluations of lecturers, student-teachers and role-holders will constitute evidence for evaluation.

Documentary analysis of learning programs, policy statements of the colleges, newsletters and Internet sites, reports and evaluation studies will also be used for the study. Triangulation between the different collected data will be conducted through various tools enabling validation of the findings.

4. SUMMARY

Israel's national program for the adaptation of the education system to the needs of the 21st century sees the integration of computerization in teaching as a present priority. According to the Ministry of Education, General-Manager's Directive [45] the proposed program offers a technological and pedagogical infrastructure for the teaching of 21st century skills and allows for the preparation of Israeli education system graduates to cope with contemporary local and global demands. The transition to computer-assisted learning-teaching processes for the realization of this purpose constitutes a complex challenge. The goal is not only to integrate this technology but also to undertake significant changes in pedagogy and teaching-learning methods. This program lacks consideration of the necessary training processes for pre-service teachers.

Kaye College and Ohalo College have set themselves the mission, as academic institutions, to train teachers for the future and to advance their professional development. Both colleges lead in the field of pedagogic innovation and constitute foci for learning, research and educational innovation. They both see the computerization program as an opportunity to establish and advance their vision. Each of these colleges, in their own way, has answered this challenge and developed different programs for the assimilation of 21st century skills in the teaching-learning processes as an integral part pre-service teachers' training. This article described the implementation of these training programs in the Kaye College (FGIN) and the Ohalo College (CMEI). Both programs deal with the training of pre-service teachers at all stages of their academic development to implement a substantive pedagogy assisted by 21st century skills and computers. Evaluation is an important part of the assimilation and implementation process. Thus, we suggest that each college that adopts a process of assimilation of ICT, adoption of pedagogic innovation and the incumbent changes should be supported by evaluation according to the RIPPLES model. Hopefully, the results of the research evaluation should constitute/serve as milestones for the assimilation of 21st century skills in other colleges.

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