Reciprocal Mentoring in Technology
Use: reflecting with a literacy educator

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ABSTRACT As the 21st century approaches, emphasis on technology has increased. Recent trends show “a new insistence that teachers must become technologically literate” (Ely et al, 1996, p. 33), but unfortunately, colleges of education are not adequately preparing teachers to use technology in the classroom (Office of Technology Assessment, 1995). This is due in part to the fact that faculty are often unable to model its use (Wetzel, 1993; Staman, 1990). New Mexico State University has implemented a pilot program using graduate students in technology to mentor faculty on how to integrate technology into their courses. Whereas mentoring usually features a more experienced person guiding a less experienced one, this program sought a more reciprocal process in which there were dynamic exchanges between team members. Most faculty successfully completed the program. This article highlights one faculty member and how, through the reciprocal process, she has implemented desired changes in her teaching.

Introduction
Preparing pre-service and in-service teachers for an ‘information society’ requires that education faculty be knowledgeable about technology resources and model their uses. Yet, research indicates (Colon et al, 1995; Office of Technology Assessment [OTA], 1995) that teachers do not feel adequately prepared to integrate technology into their teaching. According to the OTA study, technology is not a central part of the teacher preparation experience in most colleges of education, despite its importance to teacher education. Most new teachers graduate with limited knowledge on how to integrate technology into the classroom.
In recent studies, faculty identified lack of knowledge about software, time constraints, limited vision of technology’s potential for teaching, and lack of institutional recognition as obstacles to effectively integrating technology into their curricula (Staman, 1990; Wetzel, 1993). For many college of education faculty, technology training has been lacking or poorly implemented. On some campuses, the only training available is through the computer science department or computer center where trainers teach to the technology rather than their application to education. Willis (1993) argues that questions about hardware, software and how to use applications are no longer the most important topics in educational technology. Today, the major issues are related to instructional strategies, instructionally appropriate software, professional development and how to provide continuous administrative support. A study by Oke (1992) found that technology must be emphasized in pre-service education because most pre-service students are not familiar with the application of technology to education.

The literature on the use of technology by college of education faculty comes to the same conclusions as the literature regarding technology and the K-12 faculty. If technology is to become a tool of choice for learning and information access, its use must be modeled by faculty and administrators alike. In order for this to occur, an environment of support and commitment needs to exist at the university and within the department for faculty to be exposed to, acquire and implement technology into their coursework. Some institutions have found mentoring to be an effective way to encourage their faculty to begin integrating technology into their courses (Thompson et al, 1995). At New Mexico State University (NMSU), we implemented a pilot program using masters and doctoral students (who are experienced teachers and users of technology) in the ‘Learning Technologies Program’ to mentor faculty one-to-one. The graduate students received Internship credit.

One-to-one mentoring has been reported as a valuable vehicle to support desired teacher-educator change (Strudler, 1991; Thompson et al, 1996). Whereas mentoring may generally be defined as a more experienced person guiding a novice, the mentoring employed in this program was more reciprocal. The professors, experienced teacher educators, were being mentored by graduate students expert in technology but not necessarily in the content area. Similar to the procedures reported by Beisser et al (1997), the technology mentor was simultaneously mentored in the content of the experienced professor. Thus reciprocal mentoring provided multiple opportunities for dynamic exchanges in a cost-effective yet personally rewarding avenue to change in teacher education.
Pilot Faculty Mentoring Program

We began our pilot program with five faculty members and five students matched up by area of interest and expertise. It was based on a belief that in order to have successful change:

- teacher educators must feel comfortable and competent to model its use and integrate the tools into the curriculum;
- professional development must be continual;
- experiences must be contextualized and meaningful;
- teacher educators must feel empowered as change agents.

The participating Curriculum and Instruction faculty all volunteered for the program and included professors of Literacy, Bilingual Education, Multicultural Education, English as a Second Language, and the department chair. The two most computer-experienced faculty were the Literacy professor and the English as a Second Language professor. They knew the basics of technology and were very interested in integrating it into their curriculum, as well as mastering some applications that would enhance their presentations and record-keeping.

The semester’s major goal was to increase the faculty members’ comfort level and understanding of how to effectively integrate technology into their courses. Each faculty member and graduate student wrote a set of goals to be accomplished during the semester. They met each week for approximately 2 hours face-to-face to work towards these goals. The Department of Curriculum and Instruction was supportive by providing a multimedia teaching classroom and nearby labs with both Macintosh and PC formats, which also had a Software Preview Center with over 200 software packages. An additional dimension was added to this program through the mentoring relationship of the principal investigator and director of the project who monitored, guided, and facilitated the research, procedures, and presentation.

The graduate students received graduate credit for doing this as part of an Internship course and met with the project director every other week. At that time they investigated different software packages, as well as helped each other create solutions to questions their professors had asked. The students conducted an initial interview with each faculty member (see Appendix). The students kept a weekly journal of accomplishments as well as conducted research in the content field of their faculty member and in how technology was currently being used in that field. As a final product, the project director and students wrote an article, ‘Faculty from Mars, technology from Venus: mentoring is the link’ (Gonzales et al, 1997) and presented the program at SITE97.

Four out of the five faculty members were enthusiastic and made great leaps forward in their personal and professional uses of technology.
Follow-up visits with participating faculty members found them asking their students to email weekly journals, conduct research on the WWW, create multimedia presentations for projects; all technology uses they had not incorporated before. Personally, they were more comfortable using different applications and presentation tools. The one faculty member who did not make great strides met very few times with his mentor, mainly because of time constraints he had with a new administrative position.

As part of the follow-up, interviews with the literacy educator were collected by the project director, as well as visits to her classes to see how she was progressing with her technology use. This faculty member was very serious about integrating technology into her classes and was determined to change how she had been teaching. The interviews generated several themes or ‘lenses’. This next section will focus on the reciprocal mentoring process and how it influenced the literacy educator’s experience.

The Literacy Educator’s and Mentor’s Experiences

The literacy educator and her mentor had established a working relationship, integrating technology into the reading foundations courses prior to this mentoring experience. The mentor had already embraced and practiced constructivist principles in the way in which she used technology (for teaching). The faculty member was inclined to this theory but still used more traditional models in practice. Both the faculty member and the graduate student mentor were oriented and inclined towards thematic, integrated teaching. Initially using the mentor to model the integration of technology into her language arts classes as a ‘guest speaker’, the faculty member progressed to using the mentor as a consultant and coach for her work in integrating technology. The student mentor benefited during this period by gaining information regarding the teaching of reading at a pre-service level. As a result of this mutual learning experience, the literacy educator was able to successfully integrate uses of technology into her teaching, thus influencing pre-service teachers in the reading methods classes.

The mentoring facilitated a reciprocal process of mutual work that answered self-determined questions, previewed software materials, modeled strategies and brainstormed teaching ideas and suitable problem-solving. With this kind of support, the faculty member was able to redesign teacher preparation curricula in reading and writing instruction to incorporate computer technology. With increased positive responses from pre-service teachers in the reading methods class, the faculty member committed to this kind of integration in future classes and has continued that involvement. The student mentor, who wanted more experience in literacy, was able to be a part of the change process, thus being more competent to approach change with other educators for whom literacy was an important aspect of their curriculum.
Reflections and Discussion
The following section analyzes the literacy educator’s reflections before, during, and after the reciprocal mentoring process. The interviews and class visits generated several themes which are used to focus the discussion below. The five themes are: (a) Change as a Process, (b) Faculty Incentive, (c) Breaking Barriers with Mentoring, (d) Use of Technology in Literacy Instruction, and (e) Mentoring as a Reciprocal Process. The follow-up discussion adds literature support to the reciprocal mentoring program and teacher change.

**Change as a Process**

Reflection.

Getting started was a slow (and, at times, frustrating) process. I began as what can be referred to as a ‘technophobe’, but I was lucky to receive encouragement and support from technology professionals. I started using computer technology as a word processor and can remember clearly when someone first emphasized that computers were not simply glorified typewriters; they were so much more.

I probably wouldn’t have ventured beyond word processing except that I had acquired a Powerbook [portable computer] as an incentive for participating in a technology project at a previous university. The convenience of having this tool both at work and home, during travel, and at conferences allowed me opportunities to explore. The next great boost was the availability of technology in the methods classroom at New Mexico State University. With four computers and a teaching station provided in a ‘teaching classroom’, I began to move more rapidly across the bridge from personal use to uses of technology for teaching reading. I became a strong user of email, for example, and discovered how this technology could support the communication goals of literacy. I soon added an electronic pen pals project. At the same time in my personal use of computers, in my reading methods and other literacy-related classes, I began to discover how these programs could be applied.

During the semester in which I met with my technology mentor, I experimented with different activities involving computer technology and problem-based learning. The pace of my learning probably doubled during this time. With the successful experiences outweighing the difficulties, I began to see a whole new way of approaching my reading methods curriculum. After employing problem-based learning with technology, I found I could enter my methods class and find that students were already engaged in work. I was ‘hooked’ into trying more
creative and interactive practice. Often when teaching classes I've entered to find the students waiting for me before doing anything. This wasn't happening in the classroom before integrating technology.

Discussion. Conclusions as drawn by O'Bannon (1997) and quoted in the following, help to provide a context for discussing the change process:

In an information-rich society, some faculty continue to use traditional methods of instruction. In order for new teachers to be comfortable with technology, university faculty must model technology in the classroom and integrate these tools throughout the pre-service preparation period. In order for this to happen, many faculty members must change. This change will be long and slow; however, with adequate equipment and software, a supportive administration, a willing faculty and a plan, the challenge of meeting the needs of students in the 21st century can be met. (p. 320)

The literacy educator's reflections indicate the multifaceted process of teacher change. She refers to overcoming such obstacles as a lack of access to hardware and software and the lack of technology support (Cummings, 1995). As did Wilkinson (1997), this educator began with word processing in which case the technology was used to do the same things always done, only faster. It appears that it is only with much personal experience with the tools that the potential is realized, such as using word processing to compose more effectively. Similarly, the use of the Internet may start with communication needs such as email and translate to more problem-solving applications. As described by Norton & Wiburg (1998), this faculty member evidenced a transition from no use to using computer technology to support existing curricula and methods of instruction. The use of technology became just one of many tools employed in a more interactive classroom environment. In a continuing process of change, this educator is experiencing a “fundamental shift in her view of teaching” (p. 33).

Faculty Incentive

Reflections.

As mentioned previously, access and availability was an important foundation. There were other incentives for me to participate in the mentoring program and to initiate change. First there was the potential that I saw in educational technology as an opportunity to align the theory of constructivism to reading practice, and additional support was provided through participation in the mentoring program. Also, one of my administrators (department head) had also chosen to participate so that I felt that my time and participation would, at least, be recognized in terms of the promotion process.
In addition I began to see benefits to my reading methods students in the form of additional employability and their recognition of the role that technology can play in literacy acquisition. With increasing diversity in the school-age populations, computer technology supports learning by using different learning modalities and styles. I also wanted to get away from the 'Ivory Tower' reputation of many university professors. I became convinced that with technology I could infuse that curriculum with a driving vision of new possibilities for literacy instruction.

Discussion. Faculty have resisted educational technology in part due to a lack of payoff in the form of rewards and/or recognition for using technology (Cummings, 1995). In the case of this literacy educator, an inherent desire to put theories of constructivism into practice was helped by the fact that an administrator was also involved as a 'mentoree'. Software and hardware were available and an ongoing mentoring plan was in place. The fact that the learning was 'situated' in the meaningful environment of both the educator and the pre-service teachers, for whom she was responsible, provided the greatest impetus for change (Duffy & Jonassen, 1992). The potential results are future teachers who have both practical knowledge and a model for technology integration in their own teaching practice, this being similar to the goals described by Harnish & Wild (1993) in their peer mentoring research.

Breaking Barriers with Mentoring

Reflections.

There were both personal and academic barriers that I needed to address during this period, such as lack of confidence and time.

Dispelling the Expert Myth: it required a type of resiliency to move from an area (literacy) in which I felt I was a competent professional into an area (computer technology) within which I harbored secret fears of failure. I had to battle with what I call the 'Expert Myth' - an idea that those that used technology were experts. Prior to the mentoring program, I could convince myself that greater technology use was only for the talented computer user and excused my inactivity since I did not have those 'expert' attributes.

The reciprocal mentoring program increased my confidence level and created a comfort zone which helped me through the often frustrating stages of change. The spell of the Expert Myth was broken as the mentor and I struggled together to integrate technology with literacy instruction. Being a part of a faculty mentoring team, with other professors walking along similar paths, helped me feel I belonged in the broader community of those committed to using educational technology, not because we
were talented technology users but because we could see the educational benefits for students. Once inside that community, I realized that the majority of individuals using technology in their methods or other classes were simply at different levels of development.

Finding the Time: as with most professionals, time was a critical issue. For example, I did not have the time to go to the instructional lab and experiment with unfamiliar software. Therefore, scheduled visits with my mentor were essential. Having someone that I trusted help to preview and select appropriate software for my courses saved me countless hours and allowed me to focus on my true love – teaching literacy. The time and effort were well spent. As integration and my familiarity with computer technology became a natural part of my methods curriculum instead of an ‘add-on’, methods students became more engaged in learning. Instruction became easier as students became more animated and involved.

I found that time spent with the mentor was more relevant and productive than previous ‘how-to’ technology classes had been. The one-to-one support related directly to my personal and academic goals. Support from the mentor eliminated the time wasted with information above or below my current expertise. In this way, the time spent was relevant, efficient and geared directly to what was most valuable and productive for me.

Discussion. Creating a collaborative learning environment similar to the one described by Duffy & Jonassen (1992) is based on a central strategy for designing learning which is useful, meaningful or relevant to an individual. The one-to-one teaching not only allowed for greater relevance in what was being learned, but also dispelled beliefs that were previous barriers to integrating technology. As with Beisser et al (1997), the philosophical tenet that the “teacher is a learner” permeated the project (p. 323).

Time is a major factor in incorporating anything new into one’s teaching. In describing a project of matching students with faculty, DeNeef (1993) reported that “... most of the faculty saw only a burdensome commitment of even more time” (p. 22). If the learning/teaching of technology is viewed as an ‘add-on’ in a given context, certainly most educators would say that their agenda is too full; but, if the learning/teaching of technology is conceptualized as an ‘integral’ part of a curriculum, then its benefits are more easily recognizable (Norton & Wiburg, 1998). The technology mentors actively sought to view technology as within (not in addition to) the content area they were learning. This reciprocal (two-way) agreement between faculty and mentor helped to create the collaborative learning environment. Meaningful support is a time-saving advantage for individual faculty.
Use of Technology in Literacy Instruction

Reflections.

In order to link the teaching of reading with the use of technology, I had to modify my previous vision of children being ‘plugged’ into computers. The image of a child reading with a computer monitor was reminiscent of passive television watching and games, which is something I didn’t want to see in a literacy program. To make matters worse, the past software programs I had experienced in schools were drills without meaningful contexts and not amenable to the teacher’s or child’s input. Comprehension programs often reduced understanding to literal multiple choice questions. When other reading materials were created for computer programs, there were more gimmicks for playing than opportunities to read. These kinds of material were in conflict with what I considered purposeful and authentic reading experiences. What was ‘good’ in software, such as integrated packages and simulations, I did not know how to use. I could not see any depth to the use of technology in learning how to read. In addition, the hardware requirements were such that few schools or classrooms had what was needed.

With mentoring support, I was able to experience new software that fit my vision of valuable reading/writing experiences. I discovered ways to use integrated packages which provided tools such as word processing and databases. These tools supported students’ construction of knowledge as the central process. I visualized desired characteristics of such programs as follows:

1. provisions for student-centered and interactive responses;
2. incorporation of full-length reading text;
3. support for the writing process;
4. situations for problem solving;
5. inclusion of interactive multimedia;
6. availability of multiple languages;
7. provisions to dialogue with others and access information beyond the classroom walls;
8. opportunities to present utilizing multiple form and styles.

Some of the activities I integrated included creating newsletters, charts and cards. As the semester progressed, I used laser disc technology and combinations with the authoring tool, HyperStudio (1995). Story writing with programs such as Storybook Weaver (1993) was integrated along with email journaling and Internet searches. Other activities that would benefit future teachers and can be drawn upon, depending on the interest and needs of the university students, are listed as follows:
Simulations: Simulation programs can provide a context in which my students can role play and practice decision-making and problem-solving skills.

Database: Database programs can provide rich input for writing activities and can be used for purposeful opportunities to collaborate, read, write, sort, find, create and report.

WebQuest: WebQuest (Dodge, 1997; Gonzales, 1997) inquiry-based lessons use information from the Internet in combination with classroom literature and other resources.

No, technology will not replace ‘curling up with a good book’, nor will it make up an entire literacy program; but the new opportunities in literacy are invigorating for me and my students. Even though literature in hard copy is still my preference, I can see a tremendous advantage to using technology to approach diverse student populations. I do not desire technology for technology’s sake, but I do view it as an opportunity to reframe literacy methods within a constructivist curriculum.

Discussion. Reading trends and computer technology software have not traditionally moved in synchrony. When hardware and software access became more commonplace, the computer programs that were developed supported traditional teaching and a skill development model (Neill & Neill, 1990). Teachers using holistic, literature-based programs were unlikely to adopt this type of computer-based instruction. Maddux (1993) noted that the field of educational computing had been plagued by an abundance of poor-quality software, whereas the new software trends and hardware capacity of the 1990s offered so much more.

With an expanding concept of literacy that includes technology in preparing students for the ‘real world’ (Cooper, 1997), technology is now more in harmony with the search for authenticity in the reading and language arts arena (Crawford, 1997; Thompson & Montgomery, 1994). There are multiple ways in which reading and technology can interface (Willis et al, 1996). Word processing is a natural link to writing. The use of graphics and hypermedia also supports and enhances the writing process (Galloway, 1994). Others (Boone & Higgins, 1992; Davis & Shade, 1994) suggest applications for integrating hypermedia with content area reading and writing. Reilly (1994) confirms the positive learning outcomes of students composing and producing their own multimedia video images. Electronic books can also provide distinct advantages to readers by extending opportunities for interaction between the students and the story (Sharp, 1996; Harrington-Leuker, 1996).

Mentoring as a Reciprocal Process

Reflections.
Within the reciprocal mentoring program, the mentor was not there to ‘do’ technology in my classes for me. The mentor supported me in learning and using the technology myself. Thus, I had complete ownership of the technology integration while being supported with increased classroom availability and coaching. Part of my responsibilities was to share my thoughts and dreams with my mentor for the teaching of reading. As the mentor learned about my field, there were opportunities to brainstorm and dialogue; and in this process, the mentor was able to help me visualize how technology could support my goals. Overall, the reciprocal mentoring relationship answered the questions I had about technology integration. This resulted in even more study on my part, leading to a structural change in my own teaching.

The mentor had multiple opportunities to explore materials that could be utilized in classrooms and explore literacy educators’ concerns for authenticity and inquiry in reading/writing experiences. Because she desired to work in schools advancing technology, she was able to learn first-hand the types of materials and strategies that would engage teachers. The mentor and I were able to collaborate in researching reading and technology and presented together at a professional conference. All of these activities provided the mentor with experience and expertise in approaching her desired position as a technology leader in public school education.

Discussion. After trying a more traditional form of faculty development at NMSU by setting up workshops on word processing, email and other applications, it was found that faculty really had very different needs. There was also the problem of scheduling a time when a majority of the faculty could attend. While reviewing the literature, some successful programs that used the mentoring approach (Thompson et al., 1995; Wetzel, 1993) were found and used as a model for our program. We were also fortunate enough to have students who were capable of working one-to-one with faculty. As with Beisser et al. (1997), the mentorship was set up as a reciprocal relationship whereby the faculty learned about integrating technology into their courses and the graduate students learned more about a field in which they hoped to apply technology in the future. In all cases, the occasions and conditions for use arose directly out of the context of activities within each community that uses the tool (Norton & Wiburg, 1998).

Summary
In order to tap the increased access to information made possible by technology, a shift in pedagogy from the model of ‘teacher as information-provider’ to the ‘teacher as facilitator’ is needed, but the change process is slow at best. Reciprocal mentoring between graduate students in
technology and various faculty (including a faculty administrator) in teacher preparation programs provided conditions for integrating technology within constructivist principles (Brooks & Brooks, 1993). The technology graduate students and the faculty who participated in this program exchanged expertise, gaining multiple competencies. As also reported by Beisser et al (1997), the graduate student mentors profited from the close interaction with faculty members in different content areas and in the socialization of professionals at the college/university level. They now have a better understanding of what it is to work in an academic environment and are more aware of the conflicting demands on a faculty member's time.

As exemplified by the literacy educator profiled in this article, faculty members who become more comfortable with technology on a personal basis are more likely to integrate technology into their curriculum. This integration of technology has reshaped and transformed, not only the content of the curriculum, but the delivery of instruction. As indicated by reflections and discussions, the one-to-one interaction between graduate students and faculty members is another possible solution to increased faculty technology use, in a way that is concordant with their needs and/or interests and that is acquired in a shorter span of time. Being a part of a team effort appeared to dispel myths of expertise and created a broader 'comfort zone' in which to explore. The fact that an administrator also participated gave added support to the project. As faculty continue to grow in technology use, especially modeling and mentoring their pre-service teachers, the formula establishes a multiple ‘win’ situation among staff, technology students and pre-service teachers. For it is the pre-service students, our future teachers, who will need to use and integrate technology to improve learning and teaching (Schmidt, 1998).

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References


Storybook Weaver 1.0 [Computer software] (1993). Minneapolis: MECC.


Appendix: faculty interview form – educational technology support

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<th>Name ___________________________________</th>
<th>Date __________</th>
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The purpose of this interview is to talk briefly about ways I might provide technology support in two areas: technology/curriculum support and professional productivity. At the end we may set some specific follow-up goals.

**I. Technology in the Curriculum**
1. Tell me about your program, what you teach ... What are the biggest problems you have in teaching any of your courses?
2. Let’s talk about some ways technology might help in these teaching areas. List of sample technology tools by content area is attached.

**II. Professional Productivity**
1. Computer basics – copying files, managing work space, etc.
2. Writing – use of word processing from basics to how to format and desktop publishing. Word processor used __________________________
3. Presentation software – from outlines to overheads and computer presentations (using the LCD to present information).
5. Spreadsheets – for budgets, scheduling, grade books.
7. Telecommunications – electronic mail, on-line resources.
8. Use of other computer-based technologies such as CD-ROM, Videodisc.
9. Use of video in the classroom, camcorders, video-editing.
10. Authoring original materials using an authoring program like HyperCard, HyperStudio, LinkWay, Toolbook.

**III. Would you be interested in informal, one to two-hour training classes for C & I faculty in productivity areas?**
   - When would be a good time for you?
   - What other types of training would you like?
   - What, if any, specific follow-up would you like?

**Technology in the Curriculum – Possibilities**

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<tr>
<th>Language Arts/ English/ ESL</th>
<th>Prompted writing, software that supports the writing process;</th>
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<td>Story templates;</td>
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x Tutorials;
• Programs to support Teaching English to Speakers of Other Languages (TESOL);
• Literature programs (Videodisc and CD-ROM, Storybook makers).

Mathematics
• Mathematics expression tools – Math Exploration Toolkit, Function Analyzer, Algebra Toolkit;
• Graphic calculators;
• Graphing and visualization programs on the computer;
• Tutorials for mathematics topics;
• Representational manipulation programs – Hands On Math;
• Spreadsheets in mathematics;
• Word processing and database use in mathematics;
• Using Logo or LogoWriter for mathematics learning;
• HyperCard stacks.

Science/Health/Physical Education
• Simulations (The Incredible Lab);
• Probeware (measurement tools connected to the computer);
• Tutorials for different content areas;
• Use of spreadsheets, databases, and word processing in science;
• Videodisc for the science classroom (level 1 and/or level 3);
• HyperCard stacks.

Social Studies
• Simulations (Oregon Trail, Running a Store, etc.);
• Timeline programs;
• Maps, atlas data, geography support;
• Tutorials;
• Problem-solving software like Where in the world is Carmen San Diego?;
• HyperCard stacks.

Fine Arts/Industrial Arts
• Paint and draw programs – superpaint, pc-paint;
• Graphic design tools like Aldus Freehand;
• Music composing;
• CAD/CAM – computer-assisted design and computer-assisted manufacturing;
• Robotics (Lego-Logo).