

**An Roinn Oideachais agus Scileanna**

**Department of Education and Skills**

**Subject Inspection of Technical Graphics and Design  
and Communication Graphics  
REPORT**

**O’Fiaich College  
Dundalk, Co. Louth  
Roll number: 71770D**

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**A N R O I N N | D E P A R T M E N T O F  
O I D E A C H A I S | E D U C A T I O N  
A G U S S C I L E A N N A | A N D S K I L L S**

**REPORT**  
**ON**  
**THE QUALITY OF LEARNING AND TEACHING IN TECHNICAL GRAPHICS AND**  
**DESIGN AND COMMUNICATION GRAPHICS**

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**SUBJECT INSPECTION REPORT**

This report has been written following a subject inspection in O’Fiaich College. It presents the findings of an evaluation of the quality of teaching and learning in Technical Graphics and Design and Communication Graphics and makes recommendations for the further development of the teaching of these subjects in the school. The evaluation was conducted over one day, during which the inspector visited classrooms and observed teaching and learning. The inspector interacted with students and the teachers, examined students’ work, and had discussions with the teachers. The inspector reviewed school planning documentation and the teachers’ written preparation. Following the evaluation visit, the inspector provided oral feedback on the outcomes of the evaluation to the principal and the subject teachers. The board of management was given an opportunity to comment in writing on the findings and recommendations of the report, and the response of the board will be found in the appendix of this report.

**SUBJECT PROVISION AND WHOLE SCHOOL SUPPORT**

O’Fiaich College participates in the Delivering Equality of Opportunity in Schools (DEIS) action plan. It currently caters for 345 students; 207 males and 138 females. First-year students choose their optional subjects, of which Technical Graphics (TG) is one, prior to entry to the school. Thereafter, subject bands are generated to best accommodate these choices. Movement of students to different option subjects within a band is facilitated, resources permitting, up to the mid-term break in October. The school has recently developed an information sheet for each of the subjects and these are distributed to parents and students to assist in the making of informed decisions.

It is commendable that students moving to senior cycle are offered a choice of three programmes; the Leaving Certificate Vocational Programme (LCVP), the Leaving Certificate Applied (LCA) and the established Leaving Certificate. Design and Communication Graphics (DCG) is one of the optional subjects offered to those selecting the LC or the LCVP. Students choose their optional subjects for senior cycle from an open menu with option bands again formed based on students’ preferences. Students receive information and advice, at this important decision making time, from the guidance counsellor, the various programmes co-ordinators and the subject teachers. An information night is held for parents where the programmes available in the school and subject choices are discussed. Information packs are also distributed which contain subject information leaflets.

The Transition Year (TY) programme is provided as an option but does not contain a graphics module. It is recommended that the introduction of such a module be considered by senior management and the subject department. Student uptake of the subject drops sharply in the move

from junior cycle to senior cycle and the loss of continuity during TY may be a contributing factor. Furthermore a technical drawing module in TY would provide students who did not study the subject in junior cycle with an opportunity to experience graphics and thus place them in a more informed position regarding subject choice. It is suggested that a strong emphasis should be placed on *Solidworks*, freehand sketching and basic drawing skills throughout such a module. The outline of a suitable TY module is available on the Technology Subject Support Services (t4) website ([www.t4.ie](http://www.t4.ie)).

The level of time provision for the subjects is in keeping with good practice. Junior-cycle students are provided with four class periods per week and senior-cycle students with five class periods per week. The division of the allocated time into double and single class periods and their distribution across the week provides for effective teaching of the subjects. All classes are of mixed ability and access to higher and ordinary level is accommodated within class groups. Senior cycle DCG is taught by two of the six-member department. When timetabling in the future, efforts should be made to ensure that all teachers have the opportunity to teach a range of levels, cycles and programmes.

Two rooms are available for the teaching of the subjects. Both rooms are bright and clean with well organised storage for student portfolio work. One of these rooms has a traditional drawing room layout with sloping desks and is used predominantly for the teaching of TG to junior-cycle students. Subject-specific wall charts as well as a selection of students' work are displayed in the room and these contribute significantly to the creation of a learning environment appropriate for the teaching of the subjects. Exemplars of good work by first, second and third-year students were also displayed on specific notice boards and remain on display for a number of lessons. This practice is commended as a means of encouraging and motivating students and of developing awareness amongst students as to what constitutes good quality work.

The second room has been refurbished to accommodate information and communications technology (ICT) equipment and is used to teach all areas of the syllabus relating to the use of *Solidworks* computer-aided design software. Facilities include twenty-four desktop computers, a ceiling mounted data projector, printers, a scanner and a visualiser. This room also contains good displays of students' work including printouts of several full DCG assignments. The display of such work follows best practice as it raises student awareness as to what the subject involves. The members of the subject department are commended for creating and maintaining the room to such a high standard.

All members of the subject department have attended the subject-specific inservice provided by t4. In addition to this, some members of the teaching team have attended courses provided by the National Centre for Technology in Education (NCTE). One of the teachers has also attended a course on assessment for learning (AfL). The commitment of senior management and of the TG/DCG teachers to continuing professional development (CPD) deserves acknowledgement. To maximise the benefit from these training sessions it is important to share, within the subject department, the resources provided and the good practices learned.

## **PLANNING AND PREPARATION**

A co-ordinator has been appointed for both TG and DCG and these roles are rotated amongst the teaching team. Subject department planning meetings are facilitated once per term. Records of formal meetings are retained and these are shared with school management. Formal meetings are

supplemented by frequent informal meetings throughout the school year. These arrangements work well in the school.

Subject department planning folders were made available for inspection for both subjects. They follow the SDPI template and planning is well progressed. Within these documents, schemes of work have been created for each year group and the content to be covered is in line with syllabus requirements. As a next step in the development of these schemes, it is recommended that each topic be examined to determine the intended learning outcomes to be achieved by the students from that unit of study. Reference should be made to resources available to assist in the delivery of the topic such as worksheets, handouts and 3-D models as well as electronic resources such as presentations, *SolidWorks* files and useful web addresses. The cataloguing of resources in this way would prevent the duplication of work by teachers and would assist in identifying topics where additional resources need to be developed. The subject department already shares electronic resources via the school server which is good practice. Consideration should also be given to the teaching methodologies and assessment procedures found to be most effective when teaching specific areas of the subjects with detailed reference to such methodologies included within the schemes. Members of the team are urged to share their own successes while collaborating on the identification of the most effective teaching approaches.

Several useful workbooks and worksheets have been developed by the teaching team to help foster sketching skills and techniques. These form a useful resource and the subject department is commended for this work

Currently, there are no long-term goals identified, within the plans, for the further development of the subjects in the school. It is recommended that the subject department identify such goals and develop strategic action plans to achieve them. Priorities should include: increasing student uptake at higher level in the Junior Certificate; increasing the number of girls choosing the subject, particularly at senior level; reducing the significant fall-off in the number of students choosing to study the subject after completing the Junior Certificate.

As is best practice an analysis of students' outcomes in certificate examinations is carried out every year with results compared to national norms. The subject teachers should use this analysis along with the marking schemes and the chief advising examiners' reports to inform future planning for the subjects.

## **TEACHING AND LEARNING**

All lessons observed were delivered in a structured manner and linked well with previous learning. Good routines were evident with no time being wasted getting equipment set up at the start of lessons and clearing away at the end. This indicates a consistency in lesson structure. Questioning techniques were good with teachers using a combination of global and individual questioning. In most cases, the answers provided indicated that student learning was taking place.

The most frequently used teaching method in the lessons observed involved the teacher constructing drawings on the chalkboard and permeating their construction with explanations of the steps involved. Drawings were built up incrementally and this formed a good support for the less able students as well as helping the teacher to pace the lesson. Great care was taken to ensure that the students followed the different steps involved. The use by teachers of technical drawing instruments and coloured chalk ensured that chalkboard work was well presented and this served to model the standard of draughting required in the subjects. Pictorial drawings as well as

freehand sketches were also used to help illustrate difficult concepts and this worked particularly well as a means of developing students' visual-spatial reasoning.

A variety of models were incorporated into lessons. These resources were suitable for the lesson content and assisted students with their understanding of specific concepts, such as orthographic projection. In one lesson observed, the teacher had prepared a large three-dimensional model of the object to be drawn. In another lesson each student was given a piece of wood which had been shaped to match the object in the question. These models proved extremely useful during the explanation of the solution and helped the students to grasp the concept of two-dimensional representations of three-dimensional objects. It is suggested that if a large number of wooden cubes were prepared as a resource for the classroom that students could construct a wide variety of models thus further promoting students' development from concrete experience to abstract representation.

In one senior-cycle lesson observed, students were encouraged by the teacher to sketch a three-dimensional view of the solution to an interpenetration question. The principles and concept necessary to solve the problem were introduced at this stage and the sketch worked particularly well as a means of deepening students' understanding. This was an effective way of developing their visualisation skills whilst improving their proficiency in graphic communication. The development of students' freehand sketching skills is an important element of the DCG syllabus. In order to build confidence in this area it is recommended that the teaching team place an increased emphasis on the teaching of sketching to junior-cycle students.

Some use was made of ICT to link the work in the classroom to the outside world and to vary the teaching and learning experience of students. To build on this good practice, teachers should increase their use of *SolidWorks* to model solutions to questions and to use these models to support and reinforce learning. During lessons observed, there were many opportunities where the use of such models would have further improved the students' experience of the material being learned.

At present, students' access to *SolidWorks* is restricted to students in their final year of senior cycle. It is suggested that students should gain experience in the use of this software at an earlier stage, perhaps in junior cycle. This would build up the skill levels needed for the completion of the DCG project and would also act as a motivational tool.

One of the main strands of the DEIS initiative is the improvement of the literacy levels of students. To help achieve this aim the subject department distributes a laminated key words sheet to students. Teachers were also careful to use and emphasise the terminology associated with the subjects during lessons and this allowed students to assimilate subject-specific terminology while working on their own drawings. This is good practice. As a further support for students it is suggested that a key-words list be generated by teachers whilst a topic is being covered. This list could be displayed on the chalkboard, whiteboard or a sheet of paper and remain in view for the duration of the topic. Students could transcribe these new words into their copybooks, as a further support.

There was excellent teacher movement around the classroom during the different lessons observed. This helped to keep students on task and informed the pace of the lesson for the teacher. Students received appropriate individual tuition where required. The rapport between the students and teachers facilitated a relaxed classroom atmosphere and discipline was sensitively maintained at all times.

## **ASSESSMENT**

All year groups have examinations at Christmas. Junior Certificate and Leaving Certificate students have “mock” examinations in spring with all other year groups having end-of-year examinations. Reports are sent home to parents after each assessment and parents of students in each year group are invited to attend one parent-teacher meeting during the year. It is suggested that the more widespread use of common examination papers at Christmas and summer would assist in the uniform delivery of the course material to the students and would help promote the development of collaborative practices amongst the teaching team.

A sample of students’ TG and DCG portfolios was examined during the evaluation. In most instances, appropriate levels of subject material were covered and the quality of students’ drawings was in keeping with the standard expected of the year group and the level of study. However some portfolios contained a significant number of incorrect and incomplete drawings as well as untidy and poorly drafted work. There was also considerable variation between the amounts of work contained in the different portfolios examined. Written developmental comments were evident on some of the monitored sheets in line with assessment for learning (AfL) principles. It is recommended that the subject department explore ways to develop this practice to ensure that written feedback is given to all students on a regular basis. This will improve the quality of students’ portfolio work by giving recognition to students who are achieving and by giving constructive feedback for those who need direction. As a further incentive a certain percentage could be allocated to drawing portfolios when arriving at a final grade for students’ Christmas and summer examinations. This arrangement would reward students for their work all year round and would further encourage them to keep their portfolios in good order.

In all the junior cycle lessons observed during the evaluation the school supplied students with all of their drawing equipment needs, including set-squares and compasses. As a consequence of this provision, students have no equipment at home for the completion of technical drawing questions for homework. It is recommended that students should purchase their own sets of drawing equipment for home use and for use in the classroom.

From the examination of students’ journals and from discussion with teachers and pupils it was evident that homework is not allocated regularly. Homework supports the work students do in school and is an important part of the learning process. It is recommended that homework should be assigned to all year groups and to students studying the subject at all levels on a regular basis. This will allow the teacher to assess student understanding and to diagnose and address individual and class learning needs. This work can take the form of completion of class work, worksheets, and sketching, as well as full technical drawing questions.

Teachers’ records confirmed regular monitoring of student attendance and achievement. These records allow for accurate information pertaining to student progress to be communicated to parents via the student journal, parent-teacher meetings and through reports sent home.

## **SUMMARY OF MAIN FINDINGS AND RECOMMENDATIONS**

The following are the main strengths identified in the evaluation:

- The arrangements in place for the selection of option subjects for junior cycle and senior cycle are good.

- Time allocation to the subjects is good with lessons well distributed across the week.
- An appropriate learning environment for the teaching of the subjects has been created through the display of posters and students' work.
- Several workbooks to help foster freehand sketching have been developed by the teaching team.
- Teachers have engaged in extensive CPD.
- Chalkboard work was well presented and served to model the standard of draughting required from students in the subjects.
- The use of 3-D models helped support student learning.
- Teachers consistently used and emphasised the terminology associated with the subjects during lessons.
- There was a good rapport between the teachers and the students.

As a means of building on these strengths and to address areas for development, the following key recommendations are made:

- The schemes of work should be further developed so as to identify student learning outcomes for each topic as well as the most appropriate teaching resources, teaching methodologies and assessment methods.
- The subject department should increase the use of assessment for learning principles and practices to ensure that written feedback is given to all students on a regular basis.
- Long term goals need to be identified for the subjects with strategic action plans put in place to achieve them.
- Greater use should be made by teachers of *SolidWorks* to model solutions and to support and reinforce learning.
- Homework should be allocated more regularly to all year groups studying the subjects.

A post-evaluation meeting was held with the teachers of Technical Graphics and Design and Communication Graphics and with the principal at the conclusion of the evaluation when the draft findings and recommendations of the evaluation were presented and discussed.

# **Appendix**

**SCHOOL RESPONSE TO THE REPORT**

**Submitted by the Board of Management**

### **Area 1: Observations on the content of the inspection report**

O’Fiaich College thanks the inspector for the helpful manner in which this subject evaluation was carried out. The management and relevant teaching staff feel very empowered by the findings of the report which reinforce the way Technical Graphics and Design and Communication Graphics are taught in this college. The subjects department has met since this draft report was issued and used it as a key aspect to the process of review and evaluation.

The following are some observations and clarifications which are relevant to the report:

- o All teachers of Technical Graphics and Design and Communication Graphics have attended the continuous Professional Development Courses provided by National Centre for Technology in Education.
- o The inclusion of Specific Learning Outcomes in all subject and lesson plans has been identified as a major priority. These outcomes were a major component of the subject policies as presented to the inspector.
- o Expanding the student use and exposure to Solidworks software have been identified as priorities for the senior cycle curriculum for some time. Students are introduced to the programme in the first year of the senior cycle with specific assignments being done in class in term two. This is further expanded in final year in line with the fact that this topic counts for 12% of the course.
- o The subjects department is committed to use of common examination papers insofar as possible.

### **Area 2: Follow-up actions planned or undertaken since the completion of the inspection activity to implement the findings and recommendations of the inspection**

At a meeting to review and evaluate delivery of these subjects at junior and senior cycles and to plan for the current school year, it was agreed to include all the recommendations as priority items for further development.

The management of O’Fiaich College has agreed to provide a CPD course in assessment for learning specifically designed for the teachers of these two subjects.

The increased use of subject specific software such as Solidworks has been identified as a priority in the draft e-learning plan of O’Fiaich College.

The importance of implementation of the college’s homework policy has been identified as a priority within these subjects.